Hazard Mitigation Plan

Richland County, Wisconsin

Plan Update – March 20, 2017

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Acronyms

ACE	Army Corps of Engineers
ADA	Americans with Disabilities Act
ALS	Advanced Life Support
ARC	American Red Cross
ARES	Amateur Radio Emergency Services
ASCS	Agriculture Stabilization and Conservation Service
ASL	Above Sea Level
ASPR	Assistant Secretary for Preparedness and Response
BIA	Bureau of Indian Affairs
Bq	Becquerel, a unit of radioactivity
CAD	Computer Aided Dispatch
CAR	Communities At Risk
CBRNE	Chemical, Biological, Radiological, Nuclear, or Explosive
CDBG	Community Development Block Grant
CEMP	Comprehensive Emergency Management Plan
CERT	Community Emergency Response Team
CFR	Code of Federal Regulations
Ci	Curie, a unit of radioactivity
CI	City
CO	County
COAD	Community Organizations Active in Disaster
CO HWY	County Highway Department
COOP/COG	Continuity of Operations & Continuation of Government
CTH	County Highway
DFIRM	Digital Flood Insurance Rate Map
DHS	U.S. Department of Homeland Security
DNR	Wisconsin Department of Natural Resources
DOD	U.S. Department of Defense
DOJ	U.S. Department of Justice
DOT	Department of Transportation
DPW	Department of Public Works
DTM	Digital Terrain Maps
EAP	Emergency Assistance Program or Emergency Action Plan
EF	Enhanced Fujita Scale
EHS	Extremely Hazardous Substance
EM	Emergency Management

EMS	Emergency Medical Services
EMT	Emergency Medical Technician
EOC	Emergency Operations Center
EOP	Emergency Operating Procedure
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
F	Fahrenheit or Fujita Scale
FCC	Federal Communications Commission
FCIC	Federal Crop Insurance Corporation
FD	Fire Department
FEMA	Federal Emergency Management Agency
FIRMS	Flood Rate Insurance Maps
FMA	Flood Mitigation Assistance
FOIA	Freedom of Information Act
FOUO	For Official Use Only
FSA	Farm Service Agency
GIS	Geographic Information System
HazMat	Hazardous Materials
HazMit	Hazard Mitigation
HAZUS	Hazards United States
HAZUS-MH	Hazards United States Multi-hazard
HMGP	Hazard Mitigation Grant Program
HUD	U.S. Department of Housing and Urban Development
HVA	Hazard Vulnerability Analysis
HWY	Highway
ICS	Incident Command System
L	Liter
LE	Law Enforcement
LEPC	Local Emergency Planning Committee
LID	Land Information Department
LIDAR	Laser Imaging Detection and Ranging
LPDM	Lagrangian particle dispersion
LTPO	Long-Term Power Outage
LWC	Land and Water Conservation Department
MABAS	Mutual Aid Box Alarm System
MAP	FEMA’s Risk Mapping, Assessment and Planning
ME	Medical Examiner
MHz	Megahertz
MMI	Modified Mercalli Intensity Scale

MOU	Memorandum of Understanding
MPH	Miles Per Hour
MSDS	Material Safety Data Sheet
NFIA	National Flood Insurance Act
NFIF	National Flood Insurance Fund
NFIP	National Flood Insurance Program
NFPA	National Fire Protection Association
NIDIS	National Integrated Drought Information System
NIMS	National Incident Management System
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
NRP	National Response Plan
NWS	National Weather Service
OJA	Office of Justice Assistance
PA	Public Address (System)
PDM	Pre-Disaster Mitigation
PGA	Peak Ground Acceleration
PH	Public Health
PSA	Public Service Announcement
POW	Plan of Work
P&Z	Planning and Zoning
RACES	Radio Amateur Civil Emergency Service
RES1	Single Family Dwelling
RES2	Manufactured Housing
RFC	Repetitive Flood Claims
SARA	Superfund Amendments and Reauthorization Act
SBA	Small Business Administration
SMART	Spatial Management, Analysis and Resource Tracking
SPI	Standardized Precipitation Index
SRL	Severe Repetitive Loss
STH	State Highway
SWAT	Special Weapons and Tactics
TN	Township
UASI	Urban Area Security Initiative
UC	Unified Command
USDA	U.S. Department of Agriculture
USFS	U.S. Forestry Service
USGS	U.S. Geological Survey
USH	U.S. Highway

UW	University of Wisconsin
UW Ext	University of Wisconsin – Extension Office
VHF	Very High Frequency
VI	Village
VOAD	Voluntary Organizations Active in Disaster
WEM	Wisconsin Emergency Management
WISP	Wisconsin Irrigation Scheduling Program

Introduction and Background

The Richland County Hazard Mitigation Plan is intended to provide strategies for reducing susceptibility to future damage to public and private infrastructure in the county. The Richland County Emergency Management Office applied for and received assistance from the Hazard Mitigation Grant Program (HMGP). This grant program is sponsored by the U.S. Department of Homeland Security - Federal Emergency Management Agency (FEMA) and is administered by the Wisconsin Department of Military Affairs - Wisconsin Emergency Management (WEM). The procedures used in preparing this plan are based on guidance provided by FEMA and WEM and should therefore be considered consistent with the requirements and procedures in the Disaster Mitigation Act of 2000.

Section 409 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (P.L. 93-228, as amended) is the impetus for involvement of state and local governments in evaluating and mitigating natural hazards as a condition of receiving federal disaster assistance. The Federal Emergency Management Agency (FEMA) has rules in 44 CFR Part 206 Subpart M for implementing Section 409.

Section 409 states that the county is obligated to try to reduce damage susceptibility to any hazard that has received relief funding in the past. Developing a hazard mitigation plan provides an opportunity for communities to meet this requirement by developing strategies for reduction of potential losses from future natural disasters. Hazard mitigation planning is the process of developing a set of actions designed to reduce or eliminate long-term risk to people and property from hazards and their effects. Completion of this plan should put Richland County in an advantageous position when competing for pre- and post-disaster mitigation project dollars because projects have been pre-identified. The cooperation of government, private, and volunteer agencies is essential in mitigation efforts and over the long term it is hoped that implementation of this plan will save taxpayer dollars because less money is needed for post-disaster recovery activities. Furthermore, mitigation planning measures incorporated in economic or community development goals support more comprehensive and effective government. This plan evaluates the risks that all natural

hazards pose to the citizens and property of Richland County by presenting:

- A profile and analysis of past hazardous events
- An assessment of vulnerability of community assets
- Potential hazard mitigation strategies
- Methods for building community support

Plan Overview

The Richland County Hazard Mitigation Plan provides background information on Richland County and identifies those hazards that have occurred or could occur in the county. It includes a description of each hazard, its frequency of occurrence, appropriate actions in case of emergency, and possible steps to mitigate the hazard. These hazards are the basis for the development of all county emergency plans.

A well-prepared plan allows emergency management to act swiftly and efficiently in the event of a hazard, reducing the damage and the cost incurred from displacing residents and businesses. Hazard mitigation activities will be emphasized in the plan as a major component of overall emergency management. The plan is intended to provide strategies for reducing future damages to public and private infrastructure in the county, including flood damage.

Previous Planning Efforts and Legal Basis

The Richland County Emergency Management Office has completed and regularly updates the Richland County Hazard Analysis. This Hazard Vulnerability Analysis (HVA) identifies all likely natural and technological hazards that might or have occurred within the county and is based on the State of Wisconsin's HVA. The local HVA does not generally include detailed mitigation strategies for the identified hazards.

The Richland County Comprehensive Plan (finalized in 2007) was used as one source document for this plan. There have also been plans and ordinances completed by individual Richland County departments or municipalities, some of which were also used as reference materials for this plan, including:

Municipal Comprehensive Plans[1]

City of Richland Center
Town of Akan
Town of Bloom
Town of Buena Vista
Town of Dayton
Town of Eagle
Town of Forest
Town of Henrietta
Town of Ithaca
Town of Marshall
Town of Orion
Town of Richland
Town of Richwood
Town of Rockbridge
Town of Sylvan
Town of Westford
Town of Willow
Village of Boaz
Village of Cazenovia
Village of Lone Rock
Village of Viola
Village of Yuba

Richland County Zoning and Sanitation Department Ordinances[2]

Zoning
Sanitation
Non-Metallic
Land Division
County Addressing
Tri-County Airport
Shoreland/Wetland
Floodplain

[1] http://swwrpc.org/wordpress/comprehensive-plans/
[2] http://www.co.richland.wi.us/departments/zoning/ordinances/index.htm

All townships have floodplain, shoreland, and wetland zoning administered through the Richland County Zoning Office. Additionally, all townships are covered under the following ordinances:

- Floodplain
- Shoreland/Wetland
- Land Division
- Sanitation
- Non-metallic

City of Richland Center Planning and Zoning[3]

Chapters 400 through 411	Zoning Ordinance
Chapter 448	Land Division and Subdivision Ordinance
Chapter 452	Floodplain and Wetland Zoning
Chapter 475	Extraterritorial Zoning

City of Richland Center Electrical Utilities Five-Year Capital Improvement Plan (v. October 2013)

The local hazard vulnerability analysis serves as the starting point for the hazard mitigation plan. Other data on historical events is gathered from the National Weather Service's storm report database, recent news reports, local resources (e.g., website; local community ordinances; local plans such as the comprehensive plan and storm water management plans), the FEMA Region V mitigation survey, and from the memories of the local planning team members. Other plans, reports, and studies generated in and/or about the county are also used as available. Team members are presented with this educational background data and asked to rank their concern on a three-point scale {high (1), medium (2), low (3)}. From that, team members, members of the community, survey respondents, and other planning participants are asked to determine hazard mitigation strategies that might benefit their communities.

Local existing plans are referenced again at this time, with the members and authors of these plans (e.g., comprehensive, storm water management) serving as core members of the workgroup committee. The selected mitigation strategies are recorded and detailed in each chapter as well as in the table in Appendix C.

[3] http://www.ci.richland-center.wi.us/Planning_%20Zoning.htm

Mitigation strategies are reviewed over the five years of the plan's life by the leadership staff from the applicable departments (e.g., Emergency Management, Sheriff's Office/Communications, Highway, Land Conservation, Zoning, and Parks) with the elected leaders from the jurisdictions to triage projects and determine what can and should be done within the planning period. These options are usually discussed in open meetings prior to implementation, as required by Wisconsin state law. The determining factor for most projects is, obviously, budget availability. The units of government have several options for funding implementation including grants, special taxing authority (for the project and/or any matching funds), general purpose revenue from existing budgets, and regulatory authority, which can be used to require that an individual or business complete the project using their funds. The units of government use or improve, if necessary, the mechanisms described above to ensure the implementation of hazard mitigation ideas.

Plan Preparation, Adoption, and Maintenance

The Richland County Emergency Management Director contracted with Emergency Planning, Training, and Exercise Consulting (EPTEC, Inc.) to draft this plan update. A Hazard Mitigation Committee was organized to oversee the completion of this plan update. The committee members included:

- D. Gudgeon, Richland County Emergency Management
- J. Heinen, Richland County LEPC
- L. Borchardt, EPTEC, Inc. (Contractor)

An informational brochure was created and copies were distributed throughout the community at local community gathering points such as municipal halls, libraries, etc. An initial press release invited members of the public to participate in the planning process but no one expressed interest in participating. Meetings were held with the elected officials from the municipalities to explain and gather input regarding the program (e.g., previous occurrences, mitigation strategies.) The FEMA Region V survey was sent to the clerk and chief elected official of every municipality (town, village and city) as well as key county departments (e.g., planning, highway) for completion; surveys were received back from county offices and the incorporated municipalities as well as many of the

unincorporated towns. The compiled results of the surveys, along with the cover letter, are in Appendix G.

The committee met several times, first to evaluate and incorporate input from local officials and then to review and provide input on the progress of the plan update. A public notice was placed in the newspaper to invite members of the public, local officials, academia and business and industry leaders to review the plan but no comments were received. A working draft of the plan was distributed to the County Emergency Management Directors from Crawford, Grant, Iowa, Sauk, and Vernon Counties. A copy of the mitigation brochure and a list of meeting dates and informational sessions to gather public and official input can be viewed in Appendix G.

The Richland County Hazard Mitigation Plan Update Workgroup reviewed the past events records (generally gathered from the National Weather Service) and a consensus was reached on the anticipated probability of future events. This probability was designated as very high (1), high (2), medium (3), low (4), or very low (5) by the workgroup based on their evaluation and experience with the data.

The workgroup, after reviewing the draft plan, selected the potential mitigation projects, which are listed in Appendix C (Summary of Mitigation Strategies), and discussed in more detail in each chapter's Hazard Mitigation Strategies section. The workgroup participants were given the *Mitigation Ideas: Possible Mitigation Measures by Hazard Type* (Mitigation Ideas, FEMA-R5, 9/02) booklet as an aid to generating ideas. All of the ideas generated during the workgroup meetings were incorporated into the plan and can be found in the Hazard Mitigation Strategies section of each chapter and are summarized in Appendix C. Based on the information collected, each of these projects was assigned a "very high," "high," "medium," "low" or "very low" priority based on the workgroup's internal consensus assessment during a discussion of the balances of risk, reward, cost effectiveness (cost benefit) and likelihood of local will and funding (local or grant) to complete the strategy.

The workgroup also reviewed strategies from the original plan (Appendix C of that plan) and obtained updates regarding the status of those strategies (including whether they were to be carried forward in this plan update). Those updates can be found in Appendix D (Report on Previous Plan Mitigation Strategies).

The municipal leaders were briefed regarding the need to formally adopt this plan as a prerequisite for future mitigation funding eligibility. A draft has been sent to Wisconsin Emergency Management (WEM) for review and tentative approval. Based on WEM's comments, a final draft plan was completed and was forwarded to FEMA for determination of approvability. Once deemed approvable by FEMA, a general meeting was held to review the plan with members of the public, local officials, academia, and business and industry leaders. Information and adoption paperwork was provided to the municipal leaders advising them of the need to formally adopt this plan as a prerequisite for future mitigation funding eligibility.

A resolution adopting this plan has been passed by the Richland County Board, the City of Richland Center; the Villages of Boaz, Viola, and Yuba; and the Towns of Akan, Bloom, Dayton, Eagle, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford, and Willow. The Villages of Cazenovia and Lone Rock as well as the Towns of Buena Vista and Forest did not choose to independently adopt the plan. Scanned copies of the adoption resolutions can be found in Appendix B. The final plan update has been submitted to WEM for review and certification and notice of acceptance has been received of FEMA plan approval as of 20 March 2017.

The Disaster Mitigation Act of 2000 requires the monitoring, evaluation, and updating of the hazard mitigation plan every five years. This hazard mitigation plan is designed to be a "living" document and therefore will be reviewed and updated within five years from its approval date. The Richland County Hazard Mitigation Plan Workgroup will provide leadership and guidance throughout the plan's life cycle (i.e., monitoring, evaluating and updating.) Updates will allow municipal leaders and the public to provide input into the process. The public will be notified of this opportunity via legal public notices.

The process for integrating hazard mitigation actions into other planning mechanisms will be led by the county Emergency Management Director. As he receives information between the five-year update periods (e.g., comprehensive or capital improvement plans) that might be included, it will be added to Appendix H: Inter-Revision Updates. Richland County Emergency Management maintains responsibility and is the point of contact for all issues (e.g., monitoring, updating, and evaluating the effectiveness) regarding this plan. Municipalities can contact the county Emergency Management Director to add updated local

information to Appendix H at any time. Furthermore, the county Emergency Management Director will include an outreach to the plan's stakeholders (county offices, municipalities, the public, etc.) to query if there are new elements for the mitigation plan as well as asking if there are any plans (new or updates) in which the mitigation plan can and/or will be used as a source plan. Comments will be received and discussed at an publically-noticed open meeting of the county's Emergency Management committee. Note that after a disaster, the Emergency Management committee may also meet to discuss mitigation strategies that might be applicable. These same stakeholders will be invited to fully participate in the five-year plan update, which will be detailed in the updated plan documents and will fully conform to FEMA's requirements.

During the plan's lifecycle, the county and incorporated municipalities will consider the strategies listed in Appendix C as they annually prioritize "regular" maintenance projects, as they set their annual budgets, after a disaster period and as grants become available that might help off-set the costs of some of the strategies listed within the plan. The latter will be instigated by notice of these opportunities by the county Emergency Management Director. These projects will be reported in the annual letter to the county Emergency Management Director. The Director will keep and compile the inter-revision data for inclusion in the five-year update, which will be coordinated through county Emergency Management beginning at least 18 months prior to expiration and at which time they will report on their progress towards meeting the hazard mitigation goals. The update will bring together many of the same workgroup members as well as any new stakeholders (e.g., elected officials, businesses, academia, members of the public) who respond to the invitation to participate and have an interest in mitigation planning.

While not done to date, the plan participants also recognize this document as an important planning tool within the community and will use this plan as a reference as they complete other related planning in the future. The county Emergency Management Director, the Richland County Land Conservation and Zoning Departments will use this plan as they update the Richland County Comprehensive Plan as well as community ordinances such as zoning, shoreland, floodplain, wetland, etc. and in other stand-alone plans such as those for park and recreation, sustainability, and farmland preservation and will refer to it as they are involved in the planning and other preparedness activities of their municipalities. Many of these plans are on a regular updating cycle and as they

come up for renewal, Emergency Management will be notified and provide any relevant planning materials (from the hazard mitigation plan and any additional information received since the plan's approval). Several plans are under review currently. Municipalities with planning departments have also committed to referring to the mitigation plan in their zoning updates, flood and shoreland planning and in their comprehensive plans. After this plan has passed its reviews from Wisconsin Emergency Management (WEM) and the Federal Emergency Management Agency (FEMA) and is approved, the county Zoning Department and the municipalities will receive a copy. They have committed to using and referring to the mitigation plan as they complete their regularly scheduled reviews and updates of the aforementioned plans. Richland County Emergency Management will also refer to this plan in their emergency preparedness activities.

Physical Characteristics of Richland County

General Community Introduction

The earliest inhabitants were probably the Native American Mound Builders. They built many different types of mounds, many of them located near the Wisconsin River. There is a concentration of these mounds located on land now owned by the Ho-Chunk Nation. Later, the Sauk, Fox, Winnebago and Potawatomi Indians inhabited the county.

Historical records show that Black Hawk crossed the county just before he made his last stand at Bad Axe during the Black Hawk War of 1832. Black Hawk's band and the pursuing military ventured into this unknown terrain of steep ridges and valleys. Following nearby Mill Creek, some of the band headed over these rugged hills known as the Ocooch Mountains. Along the way, many Indians died from exhaustion, starvation and battle wounds.[4] The Ocooch Mountains, it should be noted, are not mountains at all but rather a region of timber-covered hills, lush valleys and sandstone formations in unglaciated southwestern Wisconsin. The name is said to have come from a small band of Indians called the Ocoche, and Ocooch is generally defined as meaning a place to hunt or fish or find nourishment. Some say the region's boundaries are defined by the Kickapoo River watershed; in rough terms it is the area midway between Madison and La Crosse, stretching from Spring Green on the south to Viroqua on the north, with Richland Center about in the middle.

The first white men who came to the county settled near the Wisconsin River in the area now known as Port Andrews in 1840. The different ethnic groups that settled in certain areas of the county are still evident today in the names of the people. The Norwegians settled the Five Points area, the Germans near Bear Valley, Keyesville and Cazenovia, the Czechs near Yuba, the Irish near Bear Valley and the Yankees in Richland Center. The quotation below describes a little of Richland County's early history:

> *An article published in the Richland county Observer, written by W. M. Fogo, thus speaks of the capabilities of*

[4] https://www.wisconsinhistory.org

the county: While the county is well adapted to almost everything known to agricultural economy, its best hold is stock raising. No section of the State is better adapted to it; the hills and valleys and crystal brooks affording convenient range, protection and water. Until recent years the farmers have paid but little attention to this industry, but latterly they are engaging in it extensively, and there are numerous fine herds and flocks, which are rapidly increasing in number and quality as the years roll on. The industries of the county are farming, in all its various forms; butter and cheesemaking; lumbering, principally in fine hard woods; milling, manufacturing of various kinds, and nearly all of the varied mechanic arts and employments. There are some twenty grist, thirty saw, and two woolen mills within the county. Many good water powers exist all over the county, quite a number of which remain to be improved. The villages of the county are: Richland Centre, Lone Rock, Sextonville, Richland City, Orion, Eagle Corners, Port Andrew, Excelsior, Boaz, Viola, West Lima, Spring Valley, Woodstock, Rockbridge, Stalwart, Cazenovia, Loyd and Ithaca.

The first school that was taught in the county, we are led to believe, was in the year 1847, by a man from Pennsylvania, but whose name has entirely escaped the memory of our informants. This pioneer school was held in a room of the house of Peter Kinder, in Richwood town, and is believed to have been a subscription one as no records are extant, showing the formation of a school district so early. However, in 1849, a building was erected for the accommodation of a district school on the land now owned by Mr. Garner, on section 27, of the town of Richwood, and a little west of the village of Port Andrew, and during the years 1849 and 1850 Mary Melanthey, now Mrs. Joseph Elliott, presided over its destinies, as school mistress. This is no doubt the first district school in Richland County.

The first post office within the limits of the county was established at a place called Sand Prairie about one and a half miles west of the village of Port Andrew, on land now owned by H J Clark, lying in the town of Richwood. This was about 1845, and Johnson Young was the postmaster. John Kincannon had the first contract for carrying the mail thither, we believe, from Mineral Point,

and he brought it on his back, going and coming afoot, which seems to have been the usual method of travel in those days. The business of saw-milling being a large one in the county, it would probably be of interest to say that the first structure of that description ever erected was built by Estes & Parrish, in the fall of 1841, and was located at or near the site of the mills now known as Rodolf's, on Mill or Eagle creek, in the town of Eagle. The first grist-mill was built at Sextonville, in the years 1851-2, by Jacob Krouskop. Prior to this time the settlers had oft-times to go fifty and seventy-five miles to mill with the little grain they had to grind. The first physician to locate within the county was Dr. Hartshorn, whose settlement at Law's or Gage's ferry, precedes any other in point of time.

Settlements were begun in all parts of the county by the beginning of 1850, and the population by that time was, according to the census returns, between 900 and 1000; during the next decade the flood of emigration, for which that period has been noted all over the northwest, rapidly filled up the waste places of this county, until in 1860, the government census placed the number of inhabitants at 9732. During the late Civil War, the emigration here, as everywhere else, came to a standstill, and the large amount of enlistments from this locality, and the large death rate in Wisconsin regiments, in the field, kept down any remarkable increase in the population, until after the close of the rebellion when immigration received a new impetus, and the number of the population has steadily grown from then until the present day.

In those early days rude log cabins, scattered throughout the county, stood on little clearings, surrounded by the dense wilderness of trees that covered the whole land, as with a mantle; but in the years that have passed, these cabins have given way to fine, comfortable frame, and in many instances palatial brick residences. There are many yet living, whose eyes have beheld these wonderful transformations, but alas, many, very many of these early pioneers have never lived to realize or enjoy the full fruition of their days of toil and hardship. The roll of those whose feet have crossed (t)he dark river is a long one. Still, in the days when they faced all the trials of a frontier life, and battled with stern nature, to keep the

wolf from the door, these hardy pioneers enjoyed much pleasure in their rude way. In the language of one of these heroes of the outpost: "It is the mistaken notion of modern aristocracy that happiness dwells only with wealth and fine equipage. Some of us can point to our log cabins, at least in memory, as our independent homes, where true content and happiness brooded over the domestic circle, and sincere gratitude gave relish to the most homely fare."

Contrast the Richland County of 1845-6 with the same as it is to-day [1884]. Then it was a dense, almost unbroken wilderness, an umbrageous desert with only here and there the scattered clearings of a few adventurous frontiersmen; and now it is largely cleared up, with good farms, fine farm houses and barns, commodious and numerous school houses and churches on every hand. In those days, the early settlers were poor in purse and struggling against fearful odds and almost insurmountable obstacles, to hew for themselves and their posterity, homes out of the forests, and all nature seemed uncongenial and seemed to turn a frowning face upon all their efforts. To-day, the inhabitants are prosperous and thrifty, and live in comparative ease and comfort. Then the "blazed" track through the woods was their only pathway or road, and the rivers and streams were crossed on the felled tree or by the still more primitive fashion of swimming; now, broad highways intersect the county and good bridges span its streams, and comfort and luxury are seen on every hand. Then, seventy miles to mill was the rule, and now the iron horse brings the necessaries of life almost to the very door.[5]

The population is at the current 2015 U.S. Census Bureau estimated number of 17,495 residents. The county seat of Richland Center has 5,066 residents (7/1/14 estimate)[6]. The face of Richland County is changing. There are more non-resident landowners, fewer dairy farms, less hay being grown and more cash grain crops being grown. Data from the Wisconsin Agriculture Statistics show a decrease in hay and an increase in corn and soybean acres over a 10-year period.[7]

[5] The quotation below is taken from *History of Crawford and Richland Counties, Wisconsin* – Union Publishing Company - Springfield, IL – 1884.
[6] http://www.census.gov/quickfacts/table/PST045215/55,55103,5567625
[7] Richland County Land and Water Resource Management Plan, 2012

Plan Area

Richland County covers 586 square miles of land area with rivers, streams, creeks and lakes covering approximately 3 square miles. The elevation at Richland Center is 731 feet above sea level. There are approximately 18,142 residents in Richland County.

One simple way to describe the state of Wisconsin is to divide it into two parts: the Driftless Area and the Glaciated Region. A large part of the Driftless Area is hilly. It preserves most of the types of topography that formerly existed throughout Wisconsin. The Glaciated Region is mostly a plain. Glacial erosion and glacial deposition, wave work, postglacial stream erosion and other processes have greatly modified the topography originally made by the weathering and pre-glacial stream work. Richland County lies within the Driftless Area.

Richland County lies within the western upland geographical province. Most of the region is a thoroughly-dissected upland, not a flat-topped or sloping surface as in northern Wisconsin or the region near Lake Michigan. The average elevation of the hilltops above sea level is about 1100 feet in St. Croix and Pierce counties in northwestern Wisconsin, 1280 feet in Vernon County, and 900 to 1200 feet in Grant County. The uplands thus stand 100 to 200 feet above the Eastern Ridges and Lowlands to the southeast and 200 to 350 feet above the Central Plain to the northeast side. From the upland itself, the strongest topographic features of the region are the great trenches or gorges of the Mississippi and Wisconsin Rivers and their numerous branches. The gorge of the Mississippi is incised more than 500 feet below the level of the upland ridges.[8]

Richland County is bordered on the east by Sauk County, on the south by Grant and Iowa Counties, on the west by Crawford and Vernon Counties and on the north by Sauk County and Vernon County.

In Wisconsin, there are three types of sub-county, full-service local government units: towns, which are unincorporated, and villages and cities, which are incorporated. Richland County contains the

[8] http://www.wisconline.com

City of Richland Center; the Villages of Boaz, Cazenovia, Lone Rock, Viola and Yuba and the Towns of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow. (See Appendix A for a map of Richland County.) A resolution adopting this plan has been passed by the Richland County Board, the City of Richland Center; the Villages of Boaz, Viola, and Yuba; and the Towns of Akan, Bloom, Dayton, Eagle, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford, and Willow. The Villages of Cazenovia and Lone Rock as well as the Towns of Buena Vista and Forest did not choose to independently adopt the plan. Copies of the adoptions can be found in Appendix B.

It should be noted that the Village of Viola is also partially in Vernon County. The Village has a close relationship with both county emergency management offices but will focus its attention on, funnel mitigation ideas to and will adopt the Richland County plan. The Village of Viola is represented in this plan in its entirety (i.e., including that small portion of land and population in Vernon County).

Geology

The geology of the county consists of outcroppings of limestone near or at the top of the bluffs with substratum sandstone. The county consists of steep hillsides, fertile valleys and an abundance of springs. Most of south/southwest Wisconsin's bedrock is sedimentary rock, consisting of sandstone and shale or limestone.

Mineral resources are divided into two categories, metallic and non-metallic resources. Metallic resources in the region include lead and zinc but there is no evidence of metallic mining in Richland County. Non-metallic resources include sand, gravel and limestone. Limestone for road building is one of the most significant non-metallic geologic resources in the area today.[9]

The Prairie Du Chien dolomite is present on the west side of Richland County along Highway 14. Near Bosstown, the Tunnel City sandstone appears. In the small village of Boaz, Wisconsin's first recorded discovery of a mastodon skeleton was made in 1897 by four farm boys. The Dorsch family excavated it and in 1915 sold

[9] Richland County Comprehensive Plan, 2012

it for display in the University of Wisconsin's Geology Museum, where it can be seen today.

Three miles east of the Boaz junction on Highway 14, the road divides and passes over another ridge where the Cambrian Jordan sandstone is well exposed. Five miles beyond lies Richland Center on the Pine River, which has cut deeply enough to expose the same older Cambrian formations that are exposed at La Crosse. At the south edge of Richland Center, a quarry on the north side of the road exposes the Tunnel City and overlying Jordan formations. Tunnel City strata here are rich in glauconitic greensands and storm deposits. Storm waves first eroded the sea bottom, concentrating flat sandstone pebbles, which were then covered with undulatory, laminated deposits. Pine Natural Bridge, a keyhole cut through Cambrian sandstones, is 8 miles north of Richland Center.

Continuing south from Richland Center on U.S. 14, white sandstones of the older Cambrian Wonewoc formation appear in roadcuts. East of Gotham, U.S. 14 passes over the broad outwash plains of the Wisconsin River Valley.[10]

Topography

Wisconsin lies in the upper Midwest between Lake Superior, the upper peninsula of Michigan, Lake Michigan and the Mississippi and Saint Croix Rivers. Its greatest length is 320 miles and greatest width 295 miles for a total area 56,066 square miles. Glaciation has largely determined the topography and soils of the state, except for the 13,360 square miles of driftless area in southwestern Wisconsin, which includes Richland County. The various glaciations created rolling terrain with nearly 9,000 lakes and several areas of marshes and swamps. Elevations range from about 600 feet above sea level along the Lake Superior and Lake Michigan shores and in the Mississippi floodplain in southwestern Wisconsin to nearly 1,950 feet at Rib and Strawberry Hills.

The Northern Highlands, a plateau extending across northern Wisconsin, is an area of about 15,000 square miles with elevations from 1,000 to 1,800 feet. This area has many lakes and is the origin of most of the major streams in the state. The slope down to the narrow Lake Superior plain is quite steep. A comparatively flat,

[10] Dott/Attig 2004

crescent-shaped lowland lies immediately south of the Northern Highlands and embodies nearly one-fourth of Wisconsin. The eastern ridges and lowlands to the southeast of the Central Plains are the most densely populated and have the highest concentration of industry and farms.

The uplands of southwestern Wisconsin west of the ridges and lowlands and south of the Central Plains make up about one-fourth of the state. This is the roughest section of the state, rising 200 to 350 feet above the Central Plains and 100 to 200 feet above the Eastern Ridges and Lowlands. The Mississippi River bluffs rise 230 to 650 feet.[11]

Richland County is in a region of timber-covered hills, lush valleys and sandstone formations in unglaciated southwestern Wisconsin referred to as the Ocooch Mountains. The name is said to have come from a small band of Indians called the Ocoche, and Ocooch is generally defined as meaning a place to hunt or fish or find nourishment. Some say the region's boundaries are defined by the Kickapoo River watershed; in rough terms it is the area midway between Madison and La Crosse, stretching from Spring Green on the south to Viroqua on the north, with Richland Center about in the middle.[12]

Richland County lies halfway between La Crosse to the northwest and Madison to the southeast, in the heart of southwest Wisconsin's unglaciated hill country. The formation of the richly sculptured landscape began millions of years ago when an ancient sea covered the land. Over time, the sea deposited hundreds of feet of limestone and sandstone over the state. As the sea gradually receded, the main drainage basins were formed, consisting of the Mississippi and Wisconsin rivers and their tributaries. These rivers and their branches began an erosive action, forming deep gorges in the layers of rock, which continued until the glacial period began. Four glaciers advanced and retreated, covering all but the southwestern part of the state. The land that later became Richland County is located almost in the center of this unglaciated area.[13]

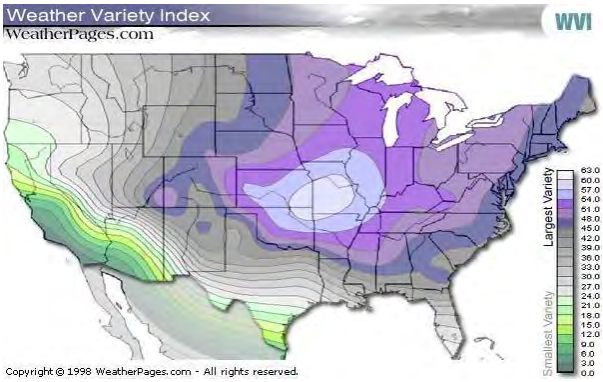
Elevations in the county range from 715 feet above sea level (ASL) at Gotham near the Wisconsin River to about 913 feet ASL in

[11] http://www.uwex.edu/sco/state.html
[12] http://www.jsonline.com/story/index.aspx?id=372956
[13] http://www.hiddenvalleys.com/data/brochure_pdf/RichlandCounty.pdf

Richland Center. The area is dominated by a rolling topography between uplands and lowland river and creek valleys.

Climate

The Wisconsin climate is notoriously varied, which can be seen in the following graphic that rated each city on variations in temperature, precipitation, storms (thunderstorms, hail, tornadoes, etc.), snow and other factors. Richland County is between Madison, WI, which ranked 8th and La Crosse, WI ranked 27th in variability out of 277 cities.[14]



The Wisconsin climate is also generally classified as typically continental with some modification by Lakes Michigan and Superior. Winters are generally cold and snowy and summers are warm. About two-thirds of the annual precipitation falls during the growing season; this is normally adequate for vegetation although there are occasional droughts. The climate favors dairy farming and the primary crops are corn, small grains, hay and vegetables. Storm tracks generally move from west to east and southwest to northeast.

The average annual temperature varies from 39°F in the north to about 50°F in the south with statewide extreme records of 114°F (Wisconsin Dells, 7/13/1936) and minus 55°F (Couderay, 2/2 & 4/1996). The extremes of temperature recorded by the National Weather Service in Richland Center range from -46 ° Fahrenheit (F) on 30 January 1951 to 110 ° F on 14 July 1936. During more than one-half of the winters, temperatures fall to minus 40° F or lower

[14] http://www.weatherpages.com/variety/main.html

and almost every winter temperatures of minus 30°F or colder are reported from northern stations. Summer temperatures above 90° F average two to four days in northern counties and about 14 days in southern districts, including Richland County. During marked cool outbreaks in summer months, the central lowlands occasionally report freezing temperatures.

The freeze-free season ranges from around 80 days per year in the upper northeast and north-central lowlands to about 180 days in the Milwaukee area. The pronounced moderating effect of Lake Michigan is well-illustrated by the fact that the growing season of 140 to 150 days along the east-central coastal area is of the same duration as in the southwestern Wisconsin valleys. The short growing season in the central portion of the state is attributed to a number of factors, among them an inward cold air drainage and the low heat capacities of the peat and sandy soils. The average date of last spring freeze ranges from early May along the Lake Michigan coastal area and southern counties to early June in the northernmost counties. The first autumn freezes occur in late August and early September in the northern and central lowlands and in mid-October along the Lake Michigan coastline, however a July freeze is not entirely unusual in the north and central Wisconsin lowlands.

The long-term mean annual precipitation ranges from 30 to 34 inches over most of the Western Uplands and Northern Highlands, then diminishes to about 28 inches along most of the Wisconsin Central Plain and Lake Superior Coastal area. The higher average annual precipitation coincides generally with the highest elevations, particularly the windward slopes of the Western Uplands and Northern Highlands. Thunderstorms average about 30 per year in northern Wisconsin to about 40 per year in southern counties and occur mostly in the summer. Occasional hail, wind and lightning damage are also reported.

The average seasonal snowfall varies from about 30 inches at Beloit to well over 100 inches in northern Iron County along the steep western slope of the Gogebic Range. Greater average snowfall is recorded over the Western Uplands and Eastern Ridges than in the adjacent lowlands. The mean dates of first snowfall of consequence (an inch or more) vary from early November in northern localities to early December in southern Wisconsin counties. Average annual duration of snow cover ranges from 85 days in southernmost Wisconsin to more than 140 days along Lake

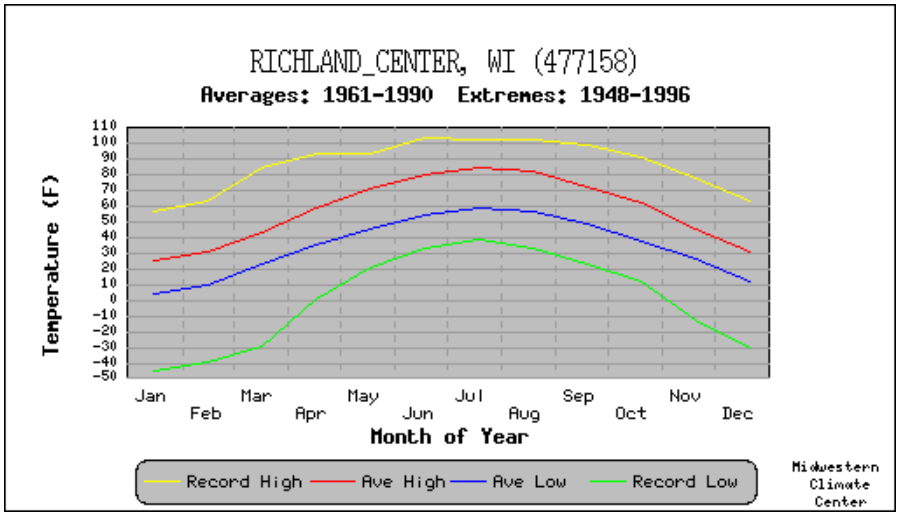
Superior. The snow cover acts as protective insulation for grasses, autumn seeded grains, alfalfa and other vegetation.[15]

Following are the basic climatology figures for Richland Center, WI based on normals from a 30-year period (1971-2000).[16]

Month	Normal Maximum Temperature	Normal Minimum Temperature	Average Temperature	Precipitation	Snowfall
JAN	26.6	5.3	15.9	1.18"	10.6"
FEB	32.8	11.3	22.0	1.15"	7.7"
MAR	44.2	23.0	33.6	2.16"	5.4"
APR	58.0	33.8	45.9	3.91"	2.4"
MAY	70.9	44.3	57.6	3.82"	0.0"
JUN	79.8	53.7	66.8	4.34"	0.0"
JUL	84.1	58.6	71.3	4.79"	0.0"
AUG	81.3	56.5	68.9	4.34"	0.0"
SEP	73.0	47.9	60.5	3.69"	0.0"
OCT	61.4	36.1	48.7	2.26"	0.1"
NOV	44.3	24.5	34.4	2.54"	4.9"
DEC	31.2	12.1	21.7	1.29"	9.4"
Year	57.3	33.9	45.6	35.46"	40.5"

The average growing season is defined as the number of days following the last 32° F freeze in the spring through the beginning of fall. Richland County's growing season averages 138 days. Shallow lakes normally freeze in late November and remain frozen until late March or early April.[17]

Climate Normals and Growing Season Summary



[15] http://www.aos.wisc.edu/~sco/

[16] NOAA/NWS-La Crosse, Natural Hazards Assessment for Richland County, WI (v. Jan. '09) p.9

[17] http://www.wisconline.com/counties/richland/climate.html

[18]Climate Normals	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Ave Daily High (F°)	25.2	31.1	43.3	58.5	70.5	79.8	84.7	81.5	72.5	61.7	44.9	30.2
Ave Daily Low (F°)	4.2	9.6	23.0	34.8	45.0	53.7	58.9	56.3	48.4	37.3	25.6	11.9
Growing Degree Days	1	3	39	163	366	523	657	595	395	208	39	3
Heating Degree Days	1559	1249	986	549	256	51	6	28	147	488	891	1364
Cooling Degree Days	0	0	0	0	33	105	217	152	12	8	0	0
Ave Precipitation (")	1.03	1.12	2.21	3.39	3.71	3.85	3.93	3.94	4.12	2.35	2.31	1.54
Ave Snowfall (")	8.8	7.3	7.0	2.2	0.0	0.0	0.0	0.0	0.0	0.0	3.9	10.6

Other miscellaneous climatological facts for the Richland County/ City of Richland Center include:[19]

- Warmest year on record – 1931 (51.4° F)
- Warmest month on record – July 1955 (78.2° F)
- Warmest day on record – July 14, 1936 (110° F)
- Greatest number of days with 90° F or warmer – 1921 (51 times)
- Coldest year on record – 1996 (42.3° F)
- Coldest month on record – January 1977 (2.5° F)
- Coldest day on record – January 30, 1951 (-46° F)
- Greatest number of days at 0° F or colder – 2008 (53 times)
- Wettest year on record – 2007 (52.68")
- Wettest month on record – August 2007 (20.81")
- Wettest day on record – October 22, 1943 (5.90")
- Driest year on record – 1958 (17.49")
- Driest month on record – March 1996 (0.00")
- Highest seasonal snowfall on record – 2007/08 (74.5")
- Highest monthly snowfall on record – January 1929 (38.1")
- Highest one-day snowfall on record – March 28, 1931 (15.0")
- Least seasonal snowfall on record – 1924/25 (8.1")

[18] Data from the weather station at Richland Center, latitude 43°20' N, longitude 90°23' W, elevation 728 ft.
[19] NOAA/NWS-La Crosse, Natural Hazards Assessment for Richland County, WI (v. Jan. '09) p.9

Hydrology

The land in Wisconsin drains into Lake Superior, Lake Michigan and the Mississippi River. The Mississippi and St. Croix Rivers form most of the western boundary. About one-half of the northwestern portion of the state is drained through the Chippewa River, while the remainder of this region drains directly into the Mississippi or St. Croix Rivers and into Lake Superior. The Wisconsin River has its source at a small lake nearly 1,600 feet above mean sea level on the Upper Michigan boundary and drains most of central Wisconsin. Most of its tributaries also spring from the many lakes in the north except for the Rock River, a Mississippi River tributary which flows through northern Illinois, eastern Wisconsin drains into Lake Michigan. Richland County drains into the Mississippi River via the Wisconsin River, which flows along the southern edge of the county.

Most of the streams and lakes in the state are ice-covered from late November to late March. Snow covers the ground in practically all the winter months except in extreme southern areas. Flooding is most frequent and most serious in April due to the melting of snow and spring rains. During this period, flood conditions are often aggravated by ice jams which back up the flood waters. Excessive rains of the thunderstorm type sometimes produce tributary flooding or flash flooding along the smaller streams and creeks.[20]

Water resources, (both surface and groundwater) are one of the most commonly used natural resources, serving intrinsic and essential functions in the community. Plants, animals, and people all consume water on a daily basis. Over 70% of all Wisconsin, communities (that is, every two out of three state citizens) rely on groundwater not only for domestic use but also for agriculture, industrial uses, recreational purposes, etc. Wisconsin is a state with a large quantity of groundwater and all Richland County residents use groundwater for domestic water consumption. Water is one of the most easily contaminated resources. Because of its mobile nature, contaminants can travel far from their source through the water cycle. Contaminants in the water cycle coming from a variety of sources are commonly known as non-point source pollution (NPSP). Non-point source pollution comes from many diffuse sources such as agriculture runoff, leaking septic systems, road salt and road building, parking lots, lawn and golf course runoff, all of which directly impact water resources. Point source pollution comes from identifiable sources such as a single factory or overflow from a sewage treatment facility.

[20] http://www.uwex.edu/sco/state.html

Groundwater reservoirs are recharged by direct precipitation. Spring is a prime time for recharge because evapotranspiration is low and melting snow and rainfall infiltrate and percolate the water table on unfrozen ground. Fall is another prime time for high recharge. During the summer, groundwater levels drop because precipitation is lower causing losses to evaporation and transpiration to exceed precipitation. In addition, groundwater is lost to surface waters by discharge in the form of springs.[21] The winter period normally lacks infiltration because of frozen ground.

Groundwater resources constitute an extremely valuable element of the natural resource base of Richland County. The groundwater reservoir not only sustains lake levels and provides the base flow of streams in the county but also comprises a major source of water for domestic, municipal and industrial water users. Like surface water, groundwater is susceptible to depletion in quantity and to deterioration in quality. Land use decisions can have impacts on groundwater, as anything that is spilled or spread on the ground can impact water quality. As a result, pollution of the aquifers is a very real threat to the county's water supplies. In July 2002, the DNR released the State of the Lower Wisconsin River Basin Report[22] which describes each sub-watershed, listing the concerns, Exceptional Resource Waters (ERW), Outstanding Resource Waters (ORW), Class I and Class II trout streams and recommendations for each watershed. Two of the watersheds have been part of the Non-point Source Pollution program, Crossman Creek/Little Baraboo River and the Middle Kickapoo River.

Richland County contains parts of ten watersheds contributing to the Mississippi River: Bear Creek, Blue River, Crossman Creek and Little Baraboo River, Green River and Crooked Creek, Knapp Creek, Middle Kickapoo River, Mill and Indian Creeks, Otter and Morrey Creeks, Upper Pine River and Willow Creek.[23]

Richland County includes major rivers such as the Wisconsin River, Pine River and the Willow and Knapp Creeks. These watercourses provide recreational opportunities such as fishing (approximately 268 miles of trout streams with 111 miles of them being Class I trout streams[24]), boating, swimming and passive recreational opportunities like bird watching and sun bathing. The rivers and their feeder streams provide habitat for fish, mussels, insects and other wildlife.[25]

[21] DeVaul, 1967
[22] http://dnr.wi.gov/water/basin/lowerwis/index.htm
[23] http://dnr.wi.gov/water/watershedsearch.aspx
[24] http://co.richland.wi.us/departments/landcons/2012_LWRM_Plan.pdf
[25] Richland County Land and Water Resource Management Plan, 2007

Soil Types

Soils types, with specific and unique characteristics, directly influence land uses. The soil of Richland County (see Appendix A: Maps) is similar to that found throughout Wisconsin. Richland County's soil survey was updated and made available in 2001. Fifty-five different soil types are found throughout Richland County. During the soil survey update nine newly describe soils were found in Richland County.[26]

Soil erosion is an issue in Richland County. As the need for hay decreases, the cropland is planted to row crops such as corn and soybeans. Without proper conservation practices such as no-till, grassed waterways and contour buffers, there is a chance for more soil erosion. The Richland County Land Conservation Department extensively uses the soils information for planning purposes.[27]

Wetlands

From the sedge meadows of southern Wisconsin to the spruce bogs in the north, wetlands cover a wide array of landscapes. They share in common the ability to support aquatic or "water loving" plants, and provide habitat for more species of plants and animals than any other type of landscape in Wisconsin.

Habitat is not their only functional value. Wetlands can also store water to prevent flooding, purify water, protect lake and stream shores from eroding and provide recreational opportunities for wildlife watchers, anglers, hunters, and boaters.[28]

Because wetlands provide many benefits to the environment, several municipal, state and federal ordinances/regulations protect wetland areas. The basic concept associated with these laws is that wetland areas on any property cannot be disturbed without a permit. Wetlands store flood waters and filter water from precipitation before it enters lakes and streams. Some wetlands also recharge local groundwater aquifers. By slowing water movement, wetlands reduce the likelihood that heavy rainfall or spring snowmelt will cause erosion and flooding. Wetlands retain eroded soil and hold nutrients that would otherwise promote excessive weed growth and algae blooms in lakes and streams. These nutrients, when held in the wetlands, produce a heavy

[26] http://websoilsurvey.nrcs.usda.gov/app/
[27] http://co.richland.wi.us/departments/landcons/2012_LWRM_Plan.pdf, pp. 21-22
[28] http://dnr.wi.gov/wetlands

growth of vegetation that provides nesting sites, food, and cover for waterfowl, small mammals, and many other types of wildlife. Wetlands also provide recreational opportunities for humans (wildlife observation, hiking, hunting, etc.).

There are three basic factors in determining whether or not a property is a wetland:

- The presence of water at, near or above the surface (hydrology).
- Water present long enough to sustain aquatic plant life (hydrophytic vegetation).
- Soils indicative of wet conditions (hydric soils).

It is important to note that "wetlands" are not only associated with the presence of water. It is possible for a property to have standing water for a portion of the year but not be a wetland; it is also possible that a true wetland with all three of the above characteristics may never have water present above the land surface.

Richland County is in the Western Coulee and Ridge ecological landscape, as defined by the 2002 Land Legacy Report put out by the WI DNR. This landscape is characterized by highly eroded and unglaciated topography. Because of the hilly terrain, wetlands in Richland County are primarily associated with rivers and streams of the area, not in generally level or upland areas.

The Wisconsin Wetland Inventory (WWI) was completed in 1985. Pre-European settlement wetland figures estimate the state had about 10 million acres of wetlands. Based on aerial photography from 1978-79, the WWI shows approximately 5.3 million acres of wetlands remaining in the state representing a loss of about 47% of original wetland acreage. This figure does not include wetlands less than 2 or 5 acres in size (minimum mapping unit varies by county). Because the original WWI utilized aerial photographs taken in the summer, some wetlands were missed. In addition, wetlands that were farmed as of the date of photography used and then later abandoned due to wet conditions were not captured as part of the WWI. (Wetland data in this inventory is to the county level only.)[29] According to the 1978-79 data, Richland County was 4.1% wetland.[30]

[29] http://www.dnr.state.wi.us/org/water/fhp/wetlands/acreage.shtml
[30] Richland County Comprehensive Plan, 2012

There are two main levels of jurisdiction (often overlapping) concerning wetlands in Richland County are the Wisconsin Department of Natural Resources and municipal zoning agencies. The Planning and Zoning Department has jurisdiction over wetlands in county zoning plans while wetlands within city or village boundaries are also subject to the appropriate municipality's regulations.

Land Use

According to the Wisconsin Department of Revenue 2004 Statement of Assessments, Richland County land use is as follows:

- Residential 2.2%
- Commercial 0.3%
- Manufacturing 0.2%
- Agricultural 68.3%
- Undeveloped 5.8%
- AG-Forest 1.5%
- Forest 20.8%
- Other (Federal, State, County, School, Cemetery) 1.0%

Currently, the dominant land use in Richland County is agriculture followed by forest. The total land area is 314,121 acres. This pattern of land usage is expected to continue in the foreseeable future. There are no developments scheduled that would change this pattern to any large degree.

Richland County has many natural areas including: [31]

- The Bear Creek Fishery Area is located on 798 acres in Sauk and Richland Counties.
- The Knapp Creek Unit – Lower Wisconsin – State Riverway is located on 5,001 acres and features deer, waterfowl and fishing.
- The Lower Wisconsin State Riverway is located on 960 acres and features wildlife, fishing and canoeing.
- The Willow Creek Fishery Area is located on 300 acres and features wildlife and fishing.
- The Pine River Public Hunting Grounds is located on 2,345 acres and features wildlife, biking and hiking.

[31] http://www.rclrs.net/ParkCommission/

- Hub City Bog is an unusual tamarack bog island and tall shrub community. A pine/hemlock relict and associated shaded cliffs are also present. This uncommon Driftless Area bog was formed in an oxbow lake left by the meandering Pine River. To the east of the bog is Soules Creek which flows at the base of a 75-foot sandstone cliff. The north-facing cliff supports a northern forest of hemlock, white pine and yellow birch with a ground cover of Labrador-tea, trailing arbutus, bunchberry, wintergreen and Sullivant's cool-wort. The tamaracks in the bog have suffered nearly 70 percent mortality due to an infestation of larch bark beetle. However, some tamarack reproduction is taking place. Many springs are present in the tamarack swamp. Most typical bog plants are absent, although sphagnum moss and some very showy species are found. Hub City Bog is owned by the University of Wisconsin and was designated a State Natural Area in 1970.
- Richwood Bottoms, located on 190 acres, features one of the best swamp white oak dominated floodplain forests along the Lower Wisconsin Riverway with some of the largest oaks reaching two feet in diameter. The extensive bottomland forest varies from a typical southern wet-mesic forest along the river to a drier bottom forest located on sandy alluvial ridges divided by swales. Swamp white oaks with basswood dominates the low ridges while the flats contain silver maple with American elm, green ash and river birch. Also present are hackberry and bitternut hickory. The understory includes buttonbush, cardinal flower, wood nettle, ostrich fern, royal fern, lance-leaf fog-fruit, false nettle and groundnut. Poison ivy is common throughout. This area provides good quality habitat for wildlife that requires isolated blocks of mature forest including the three state-threatened birds which nest here: red-shouldered hawk (Buteo lineatus), Kentucky warbler (Oporornis formosus), and cerulean warber (Dendroica cerulea). Richwood Bottoms is owned by the DNR and was designated a State Natural Area in 1991.
- Smith Slough and Sand Prairie, located on 375 acres, contains a large complex of plant communities located in the Wisconsin River floodplain on alluvial sand deposits that fluctuate no more than 6 feet in topography. The site hosts a shallow seepage-fed oxbow lake that has become hydrologically isolated from the river. Lying south and west of the lake is a large undisturbed complex of sedge meadow, shrub-carr and aquatic emergents that grades into big blue-stem dominated sand prairie and swamp white oak savanna on slightly elevated ridges. On the sand terraces along the lake is a narrow band of black oak barren with a ground flora of sedges, big and little blue-stem

and cream wild indigo. On higher ground is an area of open sand and old dunes that are now stabilized by false heather, black oak and river birch. Also present is a bottomland hardwood forest dominated by swamp white oak with silver maple, green ash, American elm and river birch in lower swales and swamp white oak, red oak, basswood and yellowbud hickory on slightly higher ground. Some trees are in excess of 4 feet in diameter. Of note is a plant species of special concern -- the small forget-me-not (Myosotis laxa). Animal species of concern include the state-endangered starhead topminnow (Fundulus notti) and goldeye (Hiodon alosoides); state-threatened Blanding's turtle (Emydoidea blandingii) and least darter (Etheostoma microperca). Smith Slough and Sand Prairie is owned by the DNR and was designated a State Natural Area in 1991.

- Located on 270 acres of Wisconsin River sand terraces, Gotham Jack Pine Barrens contains the largest and best remaining black oak and Jack pine barrens in Richland County. Also present is a floodplain forest of young timber and a small, shallow oxbow lake of high water quality, a sedge and grass dominated wet meadow, dry sand prairie and open sand blows. The barrens region is located on undulating terrain composed of very old sand blows and dunes and is recovering from past grazing. The tree canopy is quite closed and the understory remains nearly shrub-free with a ground layer dominated by sedges. Some areas are still moderately rich in native species including big and little blue-stem, Indian grass, prairie cord grass, green milkweed, silky aster, flax-leaved aster, prairie coreopsis, gray goldenrod, rough blazing-star, goat's-rue and bird's-foot violet. The floodplain forest is composed of silver maple, green ash, river birch, swamp white oak and American elm. The unusual wet meadow is dominated by cord grass, blue-joint grass, rushes and sedges and contains no shrubs and is nearly devoid of forbs. The area contains numerous rare plants and animals. Plant species of concern are small forget-me-not (Myotis laxa), poppy mallow (Callirhoe triangulata) and sycamore (Plantanus occidentalis). Animal species of concern are the tiger beetle (Cicindela patruela ustulata) and flat floater freshwater mussel (Anodonata suborbiculata). Gotham Jack Pine Barrens is owned by the DNR and was designated a State Natural Area in 1994.
- Orion Mussel Beds, located on 20 acres, features a narrow corridor of Wisconsin River bottom and adjacent shoreline that is critical habitat for numerous rare animals. Fifteen rare animals are known from this site including mussels, mayflies,

dragonflies, beetles and fish. The river bottom contains a rock and gravel substrate with underwater sandstone ledges, which contrasts with the shifting sands that are more typical of the Lower Wisconsin River bottom. The firm substrate that supports these species is restricted to a very narrow zone beginning at the shoreline extending south over the course of 4.2 miles. A diversity of rare mussels are found here including the state-threatened rock pocketbook (Arcidens confragosus), monkeyface (Quadrula metanevra) and wartyback (Q. nodulata) and the federally-endangered Higgins' eye (Lampsilis higginsii). Rare invertebrates include the smoky shadowfly (Neurocordulia molesta), elusive clubtail (Stylurus notatus), Knobel's riffle beetle (Stenelmis knobeli) and Wallace's deepwater mayfly (Spinadis wallacei). Uncommon fish include the mud darter (Etheostoma asprigene) and western sand darter (E. clarum). Orion Mussel Beds is owned by the DNR and was designated a State Natural Area in 1996.

- Bear Creek Sedge Meadow, located on 80 acres, contains two separate parcels--both sedge meadow communities with Bear Creek flowing through them. Also present is some shallow marsh along the creek. Both are recovering well from past grazing. Sedges are dominant and forbs are present in higher than normal densities. Cat-tail and bulrush are found in the wettest areas while the highest ground supports wet prairie vegetation. The midwestern endemic plant, glade mallow (Napaea dioica), is present along the creek. Other plants include blue-joint grass, sweet Indian-plantain, swamp aster, marsh marigold, swamp thistle, boneset, bottle gentian, mountain mint and cup-plant. Breeding birds include wood duck, sandhill crane, belted kingfisher, alder flycatcher, willow flycatcher, sedge and marsh wren, common yellowthroat and swamp sparrow. Clean water flows through the meadows suggesting the possibility of groundwater seepage. Bear Creek Sedge Meadow is owned by the DNR and was designated a State Natural Area in 2002.
- Ash Creek Community Forest, a 350-acre park, is Richland County's largest. It offers four miles of primitive hiking and cycling trail and a three-mile stretch of Class One trout stream.
- Krouskop Park is located in Richland Center. The Pine River flows through this 37-acre park, providing access to miles of fishing and canoeing. The park has three pools for swimming, diving and wading; a lighted athletic complex that includes football and softball fields, a basketball court, three tennis courts and two sand volleyball courts. The park also provides a large picnic area with six shelters and grills, six horseshoe courts, two

gazebos, playground equipment and a bandstand with live summer entertainment.

- Miner Hill Trail Park features fifty scenic acres of scenic along a walking trail that wanders past five overlooks and an old quarry, through woods and open meadows, to the top of a bluff with a panoramic view of the city and countryside. Along the way, hikers will find resting and picnic spots.
- Pier Natural Bridge Park is located at Hwy. 80 North, Rockbridge, in Richland County. The park obtains its name from the Pier family, who donated the land to Richland County to preserve the site as a park. The site has a very unusual geological feature - a half-mile long "finger" of blocked and layered sandstone rising nearly 60 feet above the flood plain of two merging valleys. This narrow finger is topped by tall pines and covered with green shrubs. The West Branch of the Pine River meets with the Main Branch underneath this rock formation, which forms a Natural Bridge. The Park has two historical markers - one indicating the unique rock formation and the other recognizing the significance of the Blackhawk Wars in this area. The park has a man-made tunnel which allows visitors to walk through the rock formation to the West Branch of the Pine River. There are also stairs to walk to the top of the rock formation to view the surrounding area.
- Following an abandoned railbed, the 14.8 mile-long Pine River Trail leads from Richland Center to Lone Rock. This easy-graded rail trail invites hikers and cyclers in spring, summer and fall and snowmobilers in winter.
- Eagle Cave is Wisconsin's largest Onyx Cave and is located near Richland Center.

Vegetation

Vegetation across the county consists of mostly sugar maple, basswood and elm. In southeast Richland County, mostly bur oak, white oak and elm dominate. Along the Wisconsin River in southwest Richland County, willow, soft maple and ash are the predominate species.[32]

[32] http://www.wisconline.com/counties/Richland/index.html

Demographics

Human Settlement Patterns[33]

The first evidence of human settlement in the Mississippi River Region was approximately 11,000 years ago, following closely the withdrawal of the Wisconsin glacier. These earliest known “Paleo-Indians” were hunter-gatherers that traveled in small nomadic family groups. This Ice Age era was known geologically as the Pleistocene period.

The geology of Richland County is clearly displayed by the outcropping of limestone near or at the tops of the bluffs and hills, often forming caves and fantastic shapes where exposed to the elements. This limestone overlies a substratum of sandstone that was easily quarried and used for building purposes. Early settlers sometimes used the caves as homes until they could build a cabin. The heavily timbered hillsides and ridges provided the pioneers with building lumber and a cash crop at taxpaying time. Most of the early homes were built as close as possible to springs for a constant supply of water. The first immigrants were well aware of the fertility of the soil. They used the adjective “rich” in naming much of the area. Richland County, Richland Center, Richland City (now Gotham) and the Towns of Richland, Richwood and Richmond (now Orion) all became part of the county’s heritage. A melting pot of ethnic groups – the Norwegians settled the Five Points area, the Germans settled near Bear Valley, Cazenovia and Keyesville, the Czechs populated the Yuba community and Yankee businessmen settled in Richland Center.

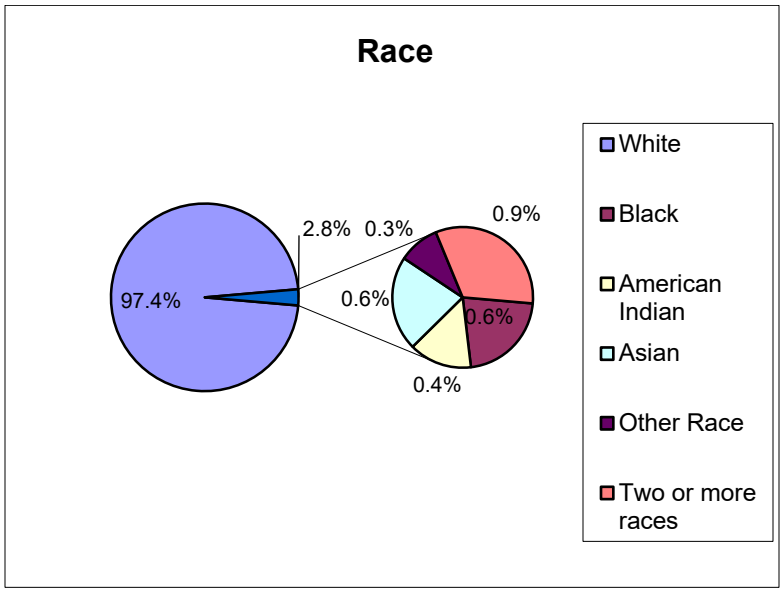
Population

In recent decades, Richland County has experienced modest development which has been accompanied by a population loss of -- 2.9% between 2010 and 2015. In the 2000 census, there were 17,924 people and 18,021 in the 2010 census; according to the 2015 U.S. Census Bureau estimate, there are 17,495 people currently residing in Richland County.[34]

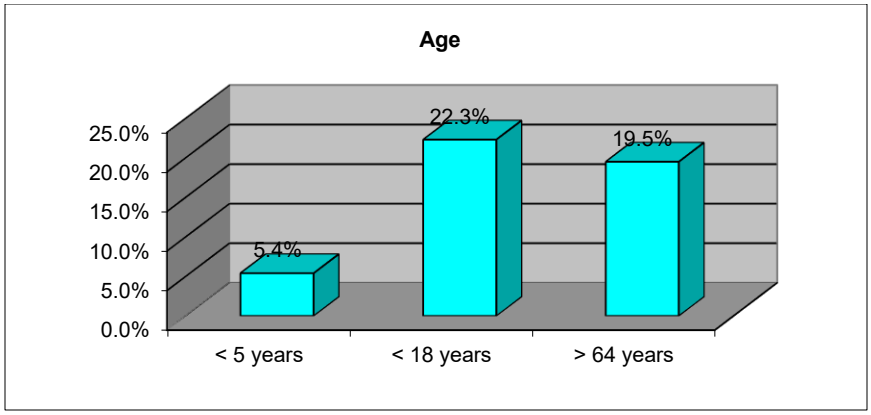
[33] http://www.hiddenvalleys.com/data/brochure_pdf/RichlandCounty.pdf
[34] http://www.census.gov/quickfacts/table/PST045215/55103,55

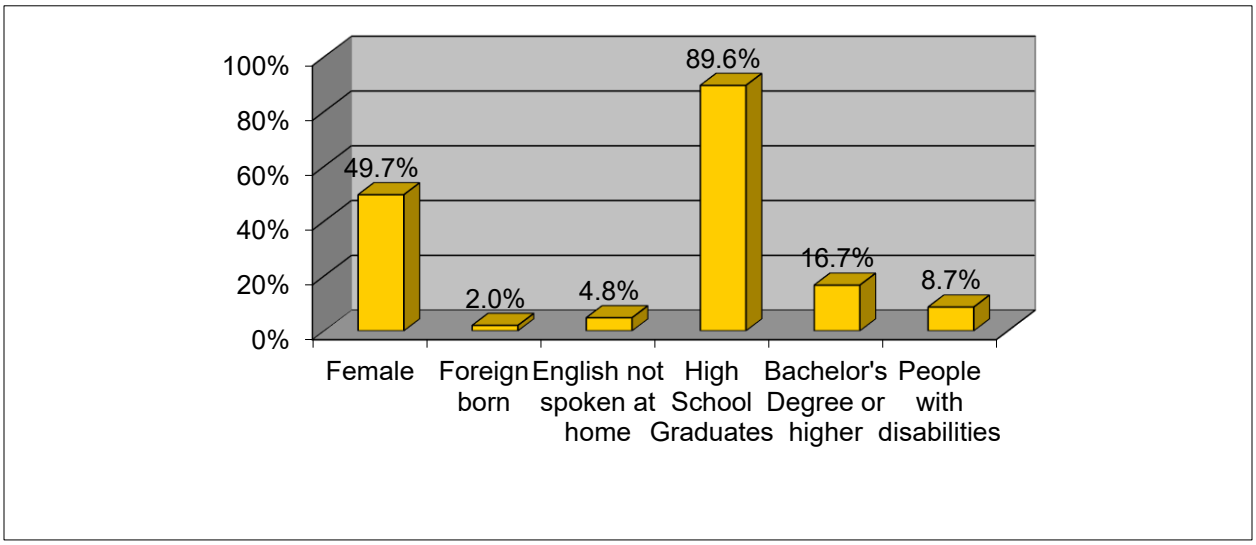
According to the 2010 U.S. census report, there are 7,489 households in Richland County with an average of 2.33 people per household. The 2014 U.S. census numbers indicate that the median household income is $44,785 and that the per capita income is $23,691. Approximately 13.5% of the people live below the poverty line. The 2014 census estimates also indicated that there are approximately 8,881 housing units within the county.

According to the 2000 U.S. Census, the overwhelming majority of people in Richland County reported that they were white. People of Hispanic or Latino origin were counted as a subcategory of those reporting that they were white, as another race or as two or more races. There are no Native American tribal lands located within Richland County.



Other miscellaneous demographic information reported by the census bureau is detailed below. These figures identify potential needs for special consideration in a disaster response or in recovery operation planning and implementation.





Richland County contains the City of Richland Center; the Villages of Boaz, Cazenovia, Lone Rock, Viola, and Yuba and the Towns of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow.

Transportation Network

Richland County has a good transportation network. A U.S. highway and state (STH) and county (CTH) roads connect the population centers. US 14 runs through center of the county and connects Gotham and Richland Center to La Crosse to the northwest and Madison to the southeast. STH 80 runs north-south through the center of the county and passes through Richland Center. STH 60 runs east-west across the southern portion of the county, roughly following the

Wisconsin River. STH 193 connects STH 80 and STH 60 near the Wisconsin River. STH 58 runs north south along the eastern side of Richland County and connects Cazenovia and Ithaca. STH 171 runs west from Boaz into Crawford County. STH 56 connects Viola in the northwest portion of the county to Richland Center, near the center of the county. STH 130 runs north south from east central Richland County to Lone Rock. Richland County has an extensive county road system including CTH A, B, C, D, E, F, G, H, I, K, M, N, O, Q, S, T, U, V, W, X, Z, AA, BB, CC, DD, EE, II, JJ, KK, MM, NN, OO, UU, ZZ, BR, SR and TB.

Richland County has maintained these roads along with others to provide a safe and efficient transportation system. With continued maintenance, these roads will continue to serve the population effectively.

Land Use and Development Trends

Richland County is primarily a rural community in the southwestern portion of the state. The county has some natural areas that will not be developed and some rural farming areas as well as light manufacturing and other primarily service businesses that have chosen to locate in the area.

The county has been experiencing slow growth on par with the state as a whole. As of the time of this plan, it is expected that this growth trend will continue.

Permitting for construction projects is managed by incorporated municipalities (i.e., cities and villages) for projects within their own boundaries; Richland County permits development for unincorporated areas (i.e., the towns).

Public Safety Support

Medical

The Richland County Office of Emergency Management, city and county emergency services responders, hospital emergency staff and various departments have developed medical and mass casualty plans. These plans will be used in the event of a disaster.

Richland County communities are served by a complete range of health facilities and health professionals, including the Richland Hospital and associated Richland Medical Center Clinic. In addition, the 3 area hospitals U.W. Hospital, Meriter Hospital and St. Mary's Hospital are readily accessible to Richland County residents. Gunderson Lutheran Hospital in La Crosse is available to the residents in the northwest corner of the county. These health care facilities will coordinate with responding agencies to ensure the best utilization of services and the least injury or loss of life from a disaster situation. It should also be noted that area hospitals have reciprocal verbal agreements for transferring critical patients during a disaster.

Richland County relies on a mix of volunteer, paid-on-call and paid staff to provide pre-hospital emergency medical services to it Richland Center and its villages and towns. (See Richland County Ambulance Zones Map in Appendix A for district boundary details.) Details for some pre-hospital medical units and their staffing are listed below:

- Richland County Ambulance Service provides primary 911 EMT-Basic (BLS) and Intermediate Tech (ALS) services to 12 townships, 2 villages and the city of Richland Center and services approximately 16,500 residents. The service area is approximately 300 square miles. Richland County Ambulance service staffs two ambulances 24/7, 365 days a year. A third ambulance is on standby.
- Cazenovia Area Rescue Squad
  License Level: EMT-Basic
- Kickapoo Valley Rescue Squad
  License Level: EMT-Basic
- Lone Rock Rescue Unit
  License Level: EMT-Basic

Each of these departments provides monthly training to their staff and they participate in periodically scheduled disaster exercises with area hospitals, other emergency medical services, law enforcement, fire services and emergency management.

Fire Service

Richland County is serviced by the following fire departments:

- Blue River Fire Department
- Cazenovia Fire Department

- LaFarge Fire Department
- Lone Rock Fire Department
- Muscoda Fire Department
- Richland Center Fire Department
- Viola Fire Department
- Yuba Fire Department

These fire departments are staffed by firefighters who attend regularly-scheduled training activities. (See Richland County Fire Zones Map in Appendix A for district boundary details.)

Richland County is serviced by the Tri-County Hazardous Materials (HazMat) Team, a NIMS Type III resource which also services Crawford and Vernon Counties from its base in Viroqua.[35] A-level HazMat response is sponsored by the State of Wisconsin and is provided by the City of Madison or City of La Crosse NIMS Type II teams.[36]

Law Enforcement

The City of Richland Center has its own full-time police department. The Villages of Lone Rock and Viola have part-time departments. The Richland County Sheriff's Department provides deputies for the rest of the county. (See the Richland County Law Enforcement Zones Maps in Appendix A for district boundary details.) Also, the Wisconsin State Patrol provides limited coverage from their district office. Additional details for some law enforcement agencies and their staffing are listed below:

- Richland County Sheriff's Office: The Richland County Sheriff's Office provides law enforcement services within the county, providing primary service to several municipalities.
- Richland Center Police Department: Law enforcement services are provided by 11 officers.
- Lone Rock Police Department: Provides services with two officers.

[35] http://emergencymanagement.wi.gov/training/docs/hazmat_county_response_teams.pdf
[36] http://emergencymanagement.wi.gov/training/docs/hazmat_regional_response_teams.pdf

- Viola Police Department: Police services are provided by one officer.

Archaeological and Historical Resources

The Wisconsin Historical Society has a listing of archaeological sites that have been identified in Richland County; this list is available to governmental agencies upon request. The National Register of Historic Places also includes a listing of 16 locations in Richland County.[37] As mitigation projects are considered, the county is committed to ensuring that archaeological and historical sites are preserved.

Historic Sites		
Historic Site Name	**Street Address**	**Municipality**
A.D. German Warehouse	316 S. Church St.	Richland Center
Bloyer Mound Group	State Highway 60	Orion Township
Bowen, Julia B. and Fred P. House	220 E. Union Street	Richland Center
Clipped Wing Eagle Mound	Restricted	Eagle Township
Coumbe, John Farmstead	Junction of STH 60 & CTH X	Richwood Township
Court Street Commercial Historic District	Roughly bounded by Mill, Church, Haseltine & Main Sts	Richland Center
Cunningham Lane Bridge	Hansberry Lane near Fancy Cr.	Rockbridge Township
Eagle Township Mound Group	Restricted	Eagle Township
Fiedler, Henry and Louisa House	Putnam and Washington Sts.	Orion Township
Hunting Eagle Mound	Restricted	Eagle Township
Richland Center Archeological District	Restricted	Richland Center
Richland Center City Auditorium	182 N. Central Ave.	Richland Center
Shadewald I Mound Group	Restricted	Eagle Township
Shadewald II Mound Group	Restricted	Eagle Township

[37] http://www.wisconsinhistory.org/Content.aspx?dsNav=Nrc:id-4294961467-dynrank-disabled,N:1160-4294961444&dsNavOnly=N:1160

Syttende Mai Site	Restricted	Richland Township
Tippesaukee Farm Rural Historic District (Boundary Increase)	Jct. of STH 60 and CTH X	Richwood Township

All of these sites have been reported to the State Historical Society of Wisconsin and are protected sites. If there is concern that a mitigation project will impact one of these or any other identified or suspected archeological site, the county will work with the proper authorities to ensure that all applicable laws and regulations are followed.

Hazard Analysis and Previous Mitigation Projects

The following sections identify those hazards that have occurred or could occur in Richland County. Each includes a description of a hazard and its frequency of occurrence. Also included is a section that describes the general vulnerabilities of the community and its infrastructure to each particular type of hazard. More detailed and specific analyses will be conducted as projects are identified for inclusion in grant applications. As part of the application process, the methodology of data collection and future development patterns will be addressed. Estimates of potential dollar losses and the methodology used to arrive at those estimates will also be described during this application process.

The National Oceanic and Atmospheric Administration (NOAA)/National Weather Service (NWS) La Crosse Office created a Natural Hazards Assessment for Richland County in October 2013. This document outlines, using their historical data, hazards faced in the county. This document served as a source for information for this plan and is a valuable adjunct to other state and local hazard assessments.[38]

Wisconsin Emergency Management (WEM) completed and regularly updates the State Hazard Mitigation Plan, which was last revised in 2011. This plan describes the hazards that have occurred or are most likely to occur within the state and includes the frequency of occurrence, potential impacts, and suggested actions to mitigate the hazard. This plan is the basis for the development of all emergency management plans and is distributed upon revision to county emergency government directors and other stakeholder agencies.

The Richland County Emergency Management Director develops and annually updates a listing of all hazards that have occurred or could occur within the county. This listing includes the definition, frequency of occurrence and actions to mitigate the hazard. In general, the threat of most hazards is consistent throughout the county. The only hazard where there were differences identified within the county was for flooding and for that hazard, specific locations are identified.

[38] http://www.crh.noaa.gov/images/arx/nathaz/RIChazards.pdf

For this plan the Richland County Hazard Mitigation Plan Workgroup reviewed the past events records and an internal workgroup consensus was reached on the anticipated probability of future events. This probability was designated as “very high”, “high”, “medium”, “low”, or “very low” by the workgroup based on their evaluation and experience with the data.

Hazard	Likelihood of Occurrence	Severity of Effects if It Does Happen
Drought and Dust Storm	High	High
Earthquake	Very Low	Low
Flood – Flash Flood and River Flood	High	High
Flood - Dam Failure	Medium	Medium
Fog	High	Low
Wildland Fire • Wildfire(Grass) • Forest Fires	 High Medium	 Medium High
Landslide	Medium	Low
Karst	Low	Low
Severe Temps – Heat	High	Medium
Severe Temps – Cold	High	Medium
Hail	High	Medium
Lightning	High	Low
Thunderstorm	Very High	Low
Tornado	Medium	High
Derecho/High Wind (straight-line)	High	High
Winter (ice/snow)	Medium	High
Utility Failure	Low	Medium

The emphasis in the following sections is on mitigation activities for each hazard as a major component of overall emergency management. Mitigation or prevention activities reduce the degree of

long-term risk to human life and property from natural and man-made hazards. The cooperation of government, academia, the private sector and volunteer agencies is essential in mitigation efforts. The Richland County Emergency Management Department is committed to working with municipalities and the private sector to ensure that county mitigation information is shared and it is incorporated into their planning as appropriate.

Each community will be given a copy of the plan to use as a reference during their own preparedness activities (i.e., planning, training, permitting, zoning). The county has its own comprehensive plan will reference this mitigation plan and its contents in the next scheduled plan update. Any municipalities completing their own comprehensive plans and will also be provided a copy of this mitigation plan for reference in their next updates.

Richland County and its municipalities have a history of identifying, planning and completing hazard mitigation projects including these, which received supplemental funding:

Community Development Block Grant (CDBG) Emergency Assistance Program (EAP) Projects:

- EAP #06-02 Richland/Vernon Counties $821,810 Rehabilitation of damaged housing units, replacement of wells/septic systems and water/sewer lines, construction of replacement housing units, demolition and clearance of hazardous structures, and acquisition/relocation

- FY06-12097 Village of Viola, Richland County $600,000 Rehabilitation of damaged housing units, replacement of wells/septic systems and water/sewer lines, construction of replacement housing units, demolition and clearance of hazardous structures, and acquisition/relocation

- EAP #07-06 Richland County $467,500 Rehabilitation of damaged housing units, replacement of wells/septic systems and water/sewer lines, construction of replacement housing units, demolition and clearance of hazardous structures, and acquisition/relocation

- EAP #08-46 Village of Viola, Richland County $573,092 Lift station repairs, floodproofing, backwater shutoff valve

- EAP #08-46 City of Richland Center, Richland County $179,000 Senior center, flood warning system

It was noted by the workgroup that there are several opportunities for grant funding from various federal and state resources including:

- **HMGP** - The Hazard Mitigation Grant Program (HMGP) is authorized by Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended. The key purpose of HMGP is to ensure that the opportunity to take critical mitigation measures to reduce the risk of loss of life and property from future disasters is not lost during the reconstruction process following a disaster. HMGP is available, when authorized under the Presidential major disaster declaration, is available in all areas of the state following a Presidential disaster declaration.[39]

    - DR-1369 DNR $84,390 Acquisition of one residential property
    - DR-1719 Richland County $36,000 New PDM Plan funded
    - DR-1768 City of Richland Center $83,346 Acquisition of one residential structure

- **PDM** - The Pre-Disaster Mitigation (PDM) program is authorized by Section 203 of the Stafford Act, 42 USC. 5133. The PDM program is designed to assist States, Territories, tribal governments, and local communities to implement a sustained pre-disaster natural hazard mitigation program to reduce overall risk to the population and structures from future hazard events, while also reducing reliance on Federal funding from future major disaster declarations.[40]

    - Pre-Disaster Mitigation (PDM) Projects Funded in the State
        - 2002 WEM All $15,520 Technical assistance Personnel, travel, and supplies
        - 2003 WEM All $32,834 Technical assistance Personnel, travel, and supplies
        - 2003C WEM All $176,812 Technical assistance Personnel, travel, and supplies
        - 2005C State of Wisconsin All $182,010 Development of structure inventory database

[39] http://www.fema.gov/hazard-mitigation-grant-program
[40] http://www.fema.gov/pre-disaster-mitigation-grant-program

- 2005C WEM All $88,480 Technical assistance Personnel, travel, and supplies
- 2006C WEM All $22,141 Technical assistance Personnel, travel, and supplies
- 2007C WEM All $70,092 Technical assistance Personnel, travel, and supplies
- 2008C WEM All $23,897 Technical assistance Personnel, travel, and supplies
- 2008C WEM $18,906 Technical assistance LPDM; personnel, travel, and supplies
- 2009C WEM All $25,579 Technical assistance Personnel, travel, and supplies
- 2010C WEM All $47,859 Technical assistance Personnel, travel, and supplies

- **FMA** - The Flood Mitigation Assistance (FMA) program is authorized by Section 1366 of the National Flood Insurance Act of 1968, as amended with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP). The Repetitive Flood Claims (RFC) program has the goal of reducing flood damages to individual properties for which one or more claim payments for losses have been made under flood insurance coverage and that will result in the greatest savings to the National Flood Insurance Fund (NFIF) in the shortest period of time.[41]
  - Flood Mitigation Assistance (FMA) Projects Funded in the State
    - 2003 WEM All $16,320 Technical support for applicants Personnel, travel, supplies
    - 2005 WEM All $11,464 Technical assistance to subgrantees Personnel, travel, supplies
    - 2007 WEM All $4,020 Technical assistance to subgrantees Personnel, travel, supplies
    - 2010 WEM All $8,994 Technical assistance to subgrantees Personnel, travel, supplies

- **406 Mitigation** – The Public Assistance-Section 406 Mitigation Funding may be considered by FEMA in a federal disaster declaration to fund mitigation measures to a public facility damaged by the event that enhance the facility's ability to resist similar damage in future events. This funding is authorized under Section 406 of The Robert T. Stafford Disaster Relief and Emergency Assistance Act and provides discretionary authority

[41] http://www.fema.gov/flood-mitigation-assistance-program

to fund mitigation measures in conjunction with the repair of the disaster-damaged facilities, which usually present themselves during the repair efforts. The mitigation measures must be related to eligible disaster-related damages and must directly reduce the potential for future similar disaster damages to the eligible facility. This work is performed on the parts of the facility that were actually damaged by the disaster and the mitigation provides protection from subsequent events. Mitigation measures must be determined to be cost-effective, technically feasible, and in compliance with statutory, regulatory, and executive order requirements. In addition, the measure cannot cause a negative impact to the facility's operation, surrounding areas, or susceptibility to damage from another hazard.[42]

- **CDBG** – The US Department of Housing and Urban Development (HUD) Community Development Block Grant (CDBG) Disaster Recovery Assistance provides flexible grants to help cities, counties, and states recover from Presidentially-declared disasters, especially in low-income areas, subject to availability of supplemental appropriations. In response to disasters, Congress may appropriate additional funding for the CDBG program as disaster recovery grants to rebuild the affected areas and provide crucial seed money to start the recovery process. Since CDBG Disaster Recovery assistance may fund a broad range of recovery activities, HUD can help communities and neighborhoods that otherwise might not recover due to limited resources. Disaster Recovery grants often supplement the disaster programs of FEMA, the SBA, and the US Army Corps of Engineers (i.e., these funds can be used for the local matching requirement of other federal grants).[43]

- **Municipal Flood Control Grant Program** - This Wisconsin Department of Natural Resources (DNR) grant is available to all cities, villages, towns, tribes, and metropolitan sewerage districts. Assistance is provided with items such as the acquisition of property, vacant land, structure removal, flood proofing, administrative support, and others.[44]

- **Dam Removal Grant Program** - This Wisconsin DNR grant is available to all cities, villages, towns, tribes, and metropolitan sewerage districts and provides 100% of eligible project costs

[42] http://www.fema.gov/public-assistance-local-state-tribal-and-non-profit/hazard-mitigation-funding-under-section-406-0
[43] http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs/drsi
[44] http://dnr.wi.gov/Aid/MunFloodControl.html

up to a maximum of $50,000 to remove a dam. Assistance is provided with items such as: the acquisition of property, vacant land, structure removal, flood-proofing, administrative support, and others.[45]

[45] http://dnr.wi.gov/aid/damremoval.html

All Hazards

One of the bedrock principles of emergency management is to approach issues from an all-hazards perspective. This is generally very cost effective because it accomplishes preparedness and/or mitigation goals for many types of disasters with one resource. Some of the all hazards mitigation projects that Richland County would like to accomplish are detailed in the following sections.

The planning committee also used the all hazards approach to identify mitigation goals for the county and all of its municipalities. The purpose hazard mitigation plan is to identify hazard areas, to assess the risks, to analyze the potential for mitigation and to recommend mitigation strategies where appropriate. Potential mitigation projects will be reviewed using criteria that stress the intrinsic value of the increased safety for people and property in relation to the monetary costs to achieve this (i.e., a cost-benefit analysis). Projects that meet the cost-benefit analysis review will be moved further into the funding process by the departmental stakeholders leading that project. With that in mind, the overall planning goals of the mitigation planning committee were:

- Objective 1: To preserve life and minimize the potential for injuries or death.
- Objective 2: To preserve and enhance the quality of life throughout Richland County by identifying potential property damage risks and recommending appropriate mitigation strategies to minimize potential property damage.
- Objective 3: To promote countywide planning that avoids transferring the risk from one community to an adjacent community, where appropriate.
- Objective 4: To identify potential funding sources for mitigation projects and form the basis for FEMA project grant applications.

Vulnerability

Perhaps the largest risk that falls under the all-hazards banner is the continuing challenge of securing funding to keep up with the rapid technological changes and advances in the public safety communications infrastructure. When departments cannot communicate with each other, they cannot be effectively coordinated in

a disaster which could cause potential delays in providing critical services to citizens in need.

Another vulnerability is the fact that not all agencies that work together in disaster response and recovery can communicate with one another (i.e., are interoperable). Local first response agencies are generally able to communicate with one another but communications-related issues will remain ongoing challenges as technologies evolve and departments acquire equipment suitable for their response.

Also, it is a continuing challenge to ensure that emergency services can notify the public in a timely manner. Because of the nature of modern society, adequate notification requires multiple outlets but managing the usage, cost, and updates of these systems is an ongoing project for all communities.

Hazard Mitigation Strategies

In general, most of the projects that can be done with current budgetary dollars are not capital improvement projects and are not very expensive. Projects that require significant capital outlays are, for the most part, grant-dependent. Since the profile (e.g., economic, geographic) of an area may change between the identification of a project in this plan and the availability of grant funds, projects will be identified within the plan and be slated for detailed study and analysis at such time as grants become available. The detailed study will identify the types and numbers of existing and future structures, the potential dollar losses to vulnerable structures and the lead agency or department who will manage the project. At that point, grant-eligible projects will be evaluated using the appropriate grant criteria for factors such as:

- Overall benefit to the community
- Economic feasibility (i.e., a cost-benefit analysis)
- Compliance with environmental, social justice and other laws

The hazard mitigation strategies listed below are not “bricks and mortar” changes. Rather, they are enhancements to computer and radio equipment and plans that allow better communication with the public in times of crisis and therefore do not reduce effects for existing or future buildings and infrastructure.

Public Alert and Notification

Public alert and notification plans are vital in a time of crisis to reduce property damage and human casualties. An advance plan allows the appropriate authorities to perform their emergency duties in an efficient manner. Richland County will maintain the following:

- Facilities, systems and procedures to activate warning and communication capabilities,
- Systems to support communications, including:
    - Sirens to warn the public. The current status of sirens in the county is:
        - Viola has two sirens and they need one more at approximately $15,000. Viola was able to install a back-up radio link so that the Vernon County Dispatch Center can activate the siren.
        - Sextonville, Gotham, Rock Bridge and Hub City would all like sirens at approximately $27,000 each.
        - The Village of Boaz would like to install a siren at approximately $20,000.
        - The county would like also to explore installing audible warning/talking sirens at campgrounds at approximately $20,000 each.
    - Telephone and radio to notify public personnel
    - Local television, radio and newspaper to spread warning information.
    - Local law enforcement, fire and rescue communications
    - An emergency communications center.

During an emergency, the general public receives information by sirens, NOAA weather radio, local broadcast or printed media, door-to-door notification by emergency services personnel and a mobile public address system. It should be noted that the ability to use the NOAA weather radio system for an expanded list of emergency messages is a positive move that makes this alert and warning tool even more valuable. As a result, the Richland County Emergency Management Department with the assistance of the local ARES/RACES volunteer group will continue to promote increased use of these radios among the public as a high priority project. Currently, the radios are offered to

the public for sale several times per year including during spring's Tornado and Severe Weather Awareness Week.

Methods for notification of the special needs populations include door-to-door warnings, foreign language media messages and closed-caption television messages. Other notices and procedures can be found in Richland County's Emergency Operations Plan which is reviewed and updated on a regular schedule.

Richland County should be capable of the following:

- Disseminate emergency warning and notification to the public though its county-wide warning systems,
- Support emergency management operations,
- Provide adequate warning and communication systems, and
- Plan for alternative means and resources in the event of a warning or communication system breakdown.

Richland County will prepare facilities, systems and procedures to activate warning and communication. During an emergency, Richland County will deliver prompt and accurate warnings to businesses and residents.

Communications Technology/Interoperable Communications

The county budget to maintain communications systems has thus far been sufficient and it as technology improves and additional interoperability grant funding is made available, the County Emergency Management Department and the Sheriff's Office will monitor and improve the system as able. Richland County would like to complete the following interoperability projects as funding allows:

- Improve daily communication ability and create a redundancies and back-ups within the system by purchasing and installing three repeaters to communication system to increase daily coverage and act as back-up for northern third of county. There was a failure in 2009 and the problem was identified in 2010. Funding began in 2011 and the project should be completed by 2016 if funding allows.
- Improve interoperability with the public school bus systems (i.e., the Ithaca, Weston, Richland Center and Kickapoo Districts). The Ithaca and Weston Districts do not have any radio capabilities and

they are trying to find budget money to install radios. The Richland Center and Kickapoo Districts should be moved from the UHF radio band to the VHF radio band so that they can communicate with other responders in a disaster but at this time Richland Center is declining to participate. This low priority project will be sought as funding allows.

- The county installed a new server and software between Zoning and the Sheriff's Office Dispatch Center to provide better data access for the Spillman program in 2012. The server is now mostly full and a new, larger one is needed. The server will be installed, if funding allows in 2015.

- Conduct a cost benefit analysis for installing a next generation / E911 (Nixle) communications system in the county. This communications system would accept texts, etc. in addition to traditional phone calls. As funding becomes available county will make improvements to its PSAP/911 center.

- The radio communication system owned and used by the Village of Viola is not reliable primarily due to terrain issues. This radio system is used by the public safety agencies in the Village including the Viola Fire Department, which also covers the Towns of Bloom, Forest, Marshall, and Sylvan. The village, with county assistance and support, is exploring options for improvement.

Website

Geographic information system (GIS) mapping data is available from the Richland County website. The County Emergency Management Office also has a general webpage[46] and has, in past disasters, been able to post links to disaster-specific information from FEMA, to volunteer, etc. In recognition of the importance of this communication tool, especially in pre-planning activities, county offices will review their web pages to ensure that important information and links for general preparedness topics are available from agencies such as the Department of Homeland Security/FEMA, the American Red Cross and Wisconsin Emergency Management. The county currently uses the website for warnings but would like to expand and use it for preparedness bulletins, hazardous materials/LEPC information and social media as well. An important part of this component is to ensure that the public is made aware of the expanded resources on the county

[46] http://em.co.richland.wi.us/

website. This medium project will be funded with current budgetary allocations.

The county would also like to purchase and install three more weather data collected stations. The goal would be to purchase web-enabled devices that could share information with the National Weather Service as well as provide current information to citizens via the county preparedness website. One of the stations would be placed on the ARES tower in the northwest corner, which is also the highest point, in the county. Each unit costs approximately $500 plus it will take an additional $750 - $1,000 per unit for installation.

Community Volunteer Organizations

Richland County has worked with a variety of volunteer groups including the Amateur Radio Emergency Services (ARES) and the Radio Amateur Civil Emergency Services (RACES) local volunteer group and their equipment, which provides communications support in disaster situations. The Emergency Management Department also has a high priority partnership project with the Ready Wisconsin AmeriCorps Preparedness where they develop preparedness programs within the county, recruit volunteers, and conduct preparedness presentations. Using current funding, Richland County, through the Emergency Management Office, will continue to support the proper integration of voluntary groups into structured disaster response.

Drought and Dust Storms

Two types of drought occur in Wisconsin: agricultural and hydrologic. Agricultural drought is a dry period that reduces crop yields. Hydrologic drought is a dry period of sufficient length and intensity to affect lake and stream levels and the height of the groundwater table. These two types of drought may, but do not necessarily, occur together.

Agricultural drought in a Wisconsin corn field in 2012.

Dust storms result from a combination of high winds and dry, loose soil conditions. While high winds and periods of drought have each occurred in Richland County, there has never been a recorded dust storm event. Since natural hazards that have occurred in the past are more likely to occur in the future, it is unlikely that a dust storm event will occur in Richland County. This assertion is further bolstered by the fact that there is very little irrigation done within the county and that the soils in Richland County are not prone to blowing. While there are concerns about topsoil erosion and some mitigation activities may be planned that would reduce the effects of these types of events, they will not be a major focus of this plan.

Physical Characteristics

The understanding that a deficit of precipitation has different impacts on groundwater, reservoir storage, soil moisture, snowpack and streamflow led to the development of the Standardized Precipitation Index (SPI) in 1993. The SPI quantifies the precipitation deficit for multiple time scales. These time scales reflect the impact of drought on the availability of the different water resources. Soil moisture conditions respond to precipitation anomalies on a relatively short scale. Groundwater, streamflow, and reservoir storage reflect longer-term

precipitation anomalies. For these reasons, the SPI is calculated for 3-, 6-, 12-, 24- and 48-month time scales.

The SPI calculation for any location is based on the long-term precipitation record for a desired period. This long-term record is fitted to a probability distribution, which is then transformed into a normal distribution so that the mean SPI for the location and desired period is zero. Positive SPI values indicate greater than median precipitation and negative values indicate less than median precipitation. Because the SPI is normalized, wetter and drier climates can be represented in the same way and wet periods can also be monitored using the SPI.

The classification system shown in the SPI values table (below) defines drought intensities resulting from the SPI. The criteria for a drought event are also defined for any of the time scales. A drought event occurs any time the SPI is continuously negative and reaches an intensity of -1.0 or less. The event ends when the SPI becomes positive. Each drought event, therefore, has a duration defined by its beginning and end and an intensity for each month that the event continues. The positive sum of the SPI for all the months within a drought event can be termed the drought's "magnitude." Current SPI maps for the United States can be found online.[47]

SPI Values[48]	
2.0+	Extremely wet
1.5 to 1.99	Very wet
1.0 to 1.49	Moderately wet
-0.99 to 0.99	Near normal
-1.0 to 1.49	Moderately dry
-1.5 to -1.99	Severely dry
-2.0 and less	Extremely dry

The Palmer Index is an older scale and is used more often by governmental organizations. It is effective in determining long-term drought (i.e., over several months) and is not as good with short-term forecasts (i.e., weeks.) It uses a zero as normal; drought is shown in terms of negative numbers and excess moisture is reflected by positive figures. The future incidence of drought is highly unpredictable and may also be localized, making it difficult to determine probability with any accuracy.

[47] http://www.drought.unl.edu/monitor/spi.htm
[48] http://www.drought.unl.edu/whatis/indices.htm#spi

Drought conditions may vary from below-normal precipitation for a few weeks to a severe lack of normal precipitation for several months. Drought primarily affects agricultural areas because the amount and timing of rainfall has a significant impact on crop production. The severity of a drought cannot therefore be completely measured in terms of precipitation alone but must include crop yields.

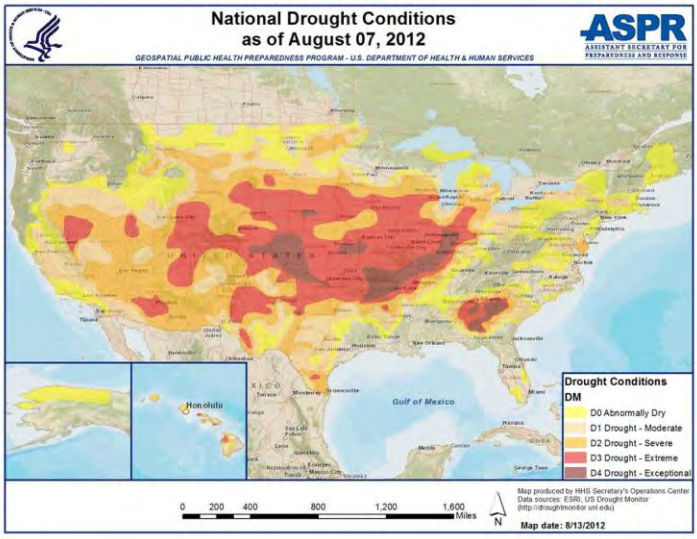
Frequency of Occurrence

Drought is a relatively common phenomenon in Wisconsin and has occurred statewide in 1895, 1910, 1939, 1948, 1958, 1976, 1988, 1992, 2003, 2005 and 2012. According to the NOAA/NWS-La Crosse Natural Hazards Assessment for Richland County[49], periods of "abnormally dry to moderate drought conditions can occur quite frequently" while "severe to extreme droughts occur far less frequently." The 1976 drought received a Presidential Emergency Declaration with damage to 64 Wisconsin counties, including Richland. Estimated losses of $624 million primarily affected the agricultural sector. Reports show that Richland County was as affected as the rest of the state in this drought, receiving money for emergency feed programs for livestock and for increased fire protection of its wilderness areas. It should be noted that only 19% ($119,434,924) of this loss was compensated by any federal program.

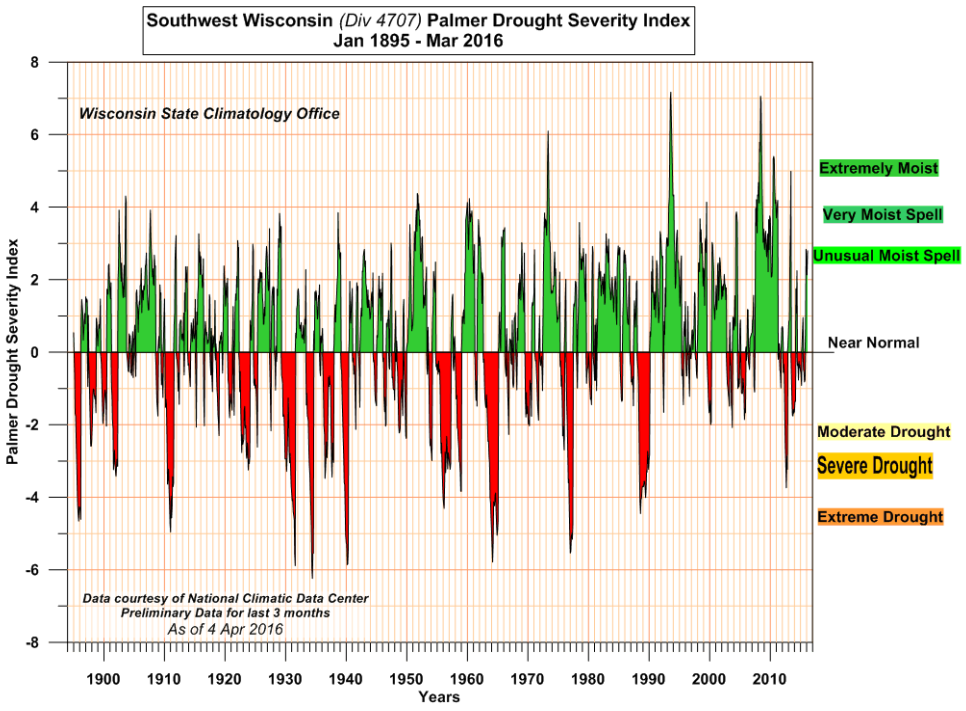
The 2012 heat wave resulted in significant droughts across more than half the country as well as increases in heat related illnesses and deaths. July, 2012 was the hottest month in US history, eclipsing the record set during the heart of the Dust Bowl in 1936. The worst of the heat was in the Midwest, the Plains, and along the Eastern Seaboard. Most of the contiguous US had record and near-record warmth for the seven-month period, except the Pacific Northwest, which was near average. The August 7, 2012 Drought Monitor map shows 52.27% of the United States and Puerto Rico in moderate drought or worse with Richland County in the D2 – Severe Drought category.[50]

[49] https://www.weather.gov/media/arx/nathaz/RIChazards.pdf

[50] 2012 Heat & Drought Federal Report, HHS ESF 8, UPDATE #2, U.S. Department of Health and Human Services, Assistant Secretary for Preparedness and Response



The Palmer Index chart for the years between January, 1895 and March, 2016 in Southwestern Wisconsin[51], which includes Richland County, follows:



As can be seen from the frequency table above, Richland County regularly experiences drought to at least a moderate level two to three

[51] http://www.aos.wisc.edu/~sco/clim-watch/graphics/pdsi-ts-07-l.gif

times every ten years. While drought is a regular occurrence, it is generally very difficult to predict with any accuracy; however, according to the Wisconsin Hazard Mitigation Plan, "the NWS and National Integrated Drought Information System (NIDIS) are improving methodology to accurately forecast drought conditions." Both organizations use a combination of current and historical precipitation, streamflow, ground water, and crop data to perform short-term and long-term forecasts".[52]

On July 15, 2005, the Governor declared a drought emergency for the entire state of Wisconsin. This declaration, the first since August 2003, allowed farmers access to additional water for crop irrigation. The Governor also declare a drought emergency due to low rainfall in July, 2009. The National Weather Service has five recorded drought events (no dust storms reported) for Richland County between 1 January 1950 and 31 January 2016:[53]

Year	Date	Location	Human Losses	Damage Losses
2012	7/10	Richland Co.	Death/Injury: 0	Property/Crop: $0
	8/1	Richland Co.	Death/Injury: 0	Property/Crop: $0
	9/1	Richland Co.	Death/Injury: 0	Property/Crop: $0
	10/1	Richland Co.	Death/Injury: 0	Property/Crop: $0
2013	9/10	Richland Co.	Death/Injury: 0	Property/Crop: $0

Considering past occurrences, it can be surmised that Richland County has a high probability of drought occurrence in the future and the likelihood of damage due to drought is considered high for agricultural losses and low for other types of losses. The probability of dust storm and damages due to dust storms would be very low.

[52] State of Wisconsin Hazard Mitigation Plan
[53] http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=55%2CWISCONSIN

Vulnerability

Droughts and dust storms are county-wide hazards that could impact Richland County disproportionately because approximately 68% of the land area is used for agricultural activities. Drought generally impacts farm output by reducing crop yields and the health and product output (e.g., milk) of livestock. As a result, a drought will seriously impact the economy of the entire county. Dust storms impact farms in the long term by blowing away the top levels of soil, which are the richest. This could economically impact the county by reducing its long-term viability for farming. . The concern for agricultural losses due to drought is difficult to estimate because each incident will impact the county differently based on the length of the drought, when it occurs in the planting season and which crops were planted in various locations in that particular season but one can see, by looking at the agricultural statistics listed below, that this sector is an important part of the Richland County economy and that the losses could be considerable:

- Average size of farms: 190 acres
- Average value of agricultural products sold per farm: $38,529
- Average value of crops sold per acre for harvested cropland: $101.29
- The value of livestock, poultry, and their products as a percentage of the total market value of agricultural products sold: 81.68%
- Harvested cropland as a percentage of land in farms: 36.70%
- Average number of cattle and calves per 100 acres of all land in farms: 17.45
- Corn for grain: 25,602 harvested acres
- All wheat for grain: 232 harvested acres
- Soybeans for beans: 9,429 harvested acres
- Vegetables: 484 harvested acres
- Land in orchards: 385 acres[54]

[54] http://www.city-data.com/county/Richland_County-WI.html

Drought is also a major risk factor for wildfire and can reduce the amount of surface water available for recreational activities (e.g., boating, fishing, water skiing) and for wildlife. This is important because, for example, low water levels can lead to an outbreak of disease (e.g., botulism) in migratory bird pools.

Prolonged drought can also impact the groundwater reserves. This can reduce the ability of the municipal water services and rural individuals on wells to draw adequate fresh water. This may especially impact rural homeowners who tend to have wells that are not drilled as deeply as municipal wells. In Richland County, the population that lives outside of the cities and villages are generally on well water. There could also be a safety risk during dust storms if they are severe enough to reduce the visibility of the roadways for drivers.

Hazard Mitigation Strategies

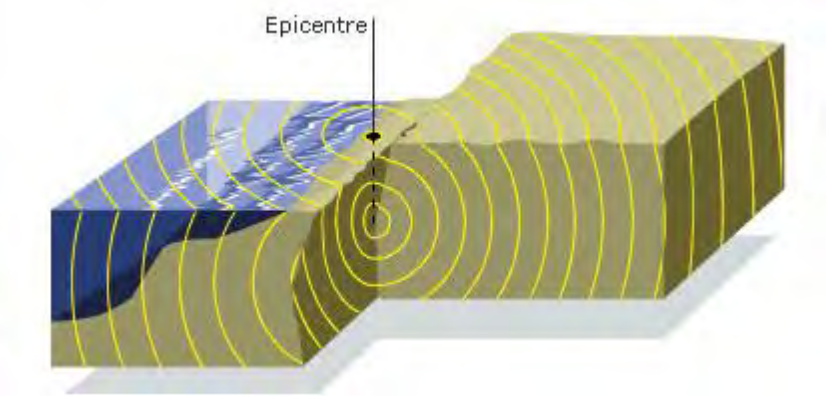
The goal of mitigating against drought and dust storms is to reduce property damage (primarily to crops), to increase the quality of life, and to preserve the environment.

Richland County farmers can contact the Richland County U.W. Extension Office and the Department of Agriculture Stabilization and Conservation Service (ASCS) for information and guidance related to drought and the purchase of crop insurance. Various federal and state publications are available regarding ground water movement, the hydrologic cycle and irrigation methods. These agencies are also the lead agencies for obtaining emergency food and water supplies for agricultural use and for providing information regarding crop insurance. The Wisconsin Department of Natural Resources (DNR) also can provide assistance and permits for stream pumping for farms.

The hazard mitigation strategies listed above primarily involve providing information on water conservation measures to farmers and the public. Water conservation will ensure that the resource is available for critical residential, business, and agricultural uses (e.g., drinking, food irrigation, manufacturing, firefighting) and good farming practices may help prevent erosion of the rich topsoil found in Richland County. Since drought and dust storms are not hazards that affect buildings or traditional infrastructure (e.g., bridges, culverts) these strategies did not need to be designed to reduce damages to existing or future buildings and infrastructure.

Earthquakes

An earthquake is a shaking or sometimes violent trembling of the earth which results from the sudden shifting of rock beneath the earth's crust. This sudden shifting releases energy in the form of seismic waves (wave-like movement of the earth's surface.)[55]



Physical Characteristics

Earthquakes can strike without warning and may range in intensity from slight tremors to great shocks. They can last from a few seconds to over five minutes and they may also occur as a series of tremors over a period of several days. The actual movement of the ground during an earthquake is seldom the direct cause of injury or death. Casualties usually result from falling objects and debris because the shocks have shaken, damaged or demolished buildings and other structures. Movement may trigger fires, dam failures, landslides or releases of hazardous materials that compound an earthquake's disastrous effect.

Earthquakes are measured by two principle methods: seismographs and human judgment. The seismograph measures the magnitude of an earthquake and interprets the amount of energy released on the Richter Scale, a logarithmic scale with no upper limit. For example, an earthquake measuring 6.0 on the Richter Scale is ten times more powerful than a 5.0 and 100 times more powerful than a 4.0. This is a measure of the absolute size or strength of an earthquake and does not consider the effect at any specific location. The Modified Mercalli

[55] http://news.bbc.co.uk/2/shared/bsp/hi/pdfs/earthquake_guide.pdf

Intensity (MMI) Scale measures the strength of a shock at a particular location (i.e., intensity.)

A third less often used way of measuring an earthquake's severity involves comparing its acceleration to the normal acceleration caused by the force of gravity. The acceleration due to gravity, often noted "g," is equal to 9.8 meters per second. Peak Ground Acceleration (PGA) measures the rate of change of motion relative to the rate of acceleration due to gravity and is expressed as a percentage. These three scales can be roughly correlated, as expressed in the table that follows:[56]

Earthquake PGA, Magnitude and Intensity Comparison Table			
PGA [%g]	**Magnitude [Richter]**	**Intensity [MMI]**	**Description [MMI]**
<0.17	1.0 - 3.0	I	I. Not felt except by a very few under especially favorable conditions.
0.17 - 1.4	3.0 - 3.9	II - III	II. Felt only by a few persons at rest, especially on upper floors of buildings. III. Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
1.4 - 9.2	4.0 - 4.9	IV - V	IV. Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing cars rock noticeably. V. Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
9.2 - 34	5.0 - 5.9	VI - VII	VI. Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight. VII. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
34 - 124	6.0 - 6.9	VII - IX	VIII. Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. IX. Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
>124	7.0 and higher	VIII or higher	X. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent. XI. Few, if any [masonry] structures remain standing. Bridges destroyed. Rails bent greatly. XII. Damage total. Lines of sight and level are distorted. Objects thrown into the air.

Most of Wisconsin's occurrences have not been severe, with only one registering 5.1 on the Richter Scale.

[56] Wald, Quitoriano, Heaton and Kanamori, 1999

Frequency of Occurrence

Earthquakes that have affected Wisconsin from 1899 to 2004 are listed in the table that follows. The most severe earthquake in Wisconsin was the record earthquake of 1811, centered along the New Madrid Fault. Most earthquakes that do occur in Wisconsin are very low in intensity and can hardly be felt. These very minor earthquakes are fairly common, occurring every few years. Events of moderate magnitude have occurred in locations in Illinois and Michigan. Those and other stronger earthquakes centered in other parts of the country have been felt primarily in southern Wisconsin.

Date	Location	Latitude North	Longitude West	Maximum Intensity	Magnitude
10/12/1899	Kenosha	42° 34'	87° 50'	II	3.0
3/13/1905	Marinette	45° 08'	87° 40'	V	3.8
4/22/1906	Shorewood	43° 03'	87° 55'	II	3.0
4/24/1906	Milwaukee	43° 03'	87° 55'	III	--
1/10/1907	Marinette	45° 08'	87° 40'	III	--
5/26/1909	Beloit	42° 30'	89° 00'	VII	5.1 (max)
10/7/1914	Madison	43° 05'	89° 23'	IV	3.8
5/31/1916	Madison	43° 05'	89° 21'	II	3.0
7/7/1922	Fond du Lac	43° 47'	88° 29'	V	3.6
10/18/1931	Madison	43° 05'	89° 23'	III	3.4
12/6/1933	Stoughton	42° 54'	89° 15'	IV	3.5
11/7/1938	Dubuque	42° 30'	90° 43'	II	3.0
11/7/1938	Dubuque	42° 30'	90° 43'	II	3.0
11/7/1938	Dubuque	42° 30'	90° 43'	II	3.0
2/9/1943	Thunder Mountain	45° 11'	88° 10'	III	3.2
5/6/1947	Milwaukee	43° 00'	87° 55'	V	4.0
1/15/1948	Lake Mendota	43° 09'	89° 41'	IV	3.8
7/18/1956	Oostburg	43° 37'	87°45'	IV	3.8
7/18/1956	Oostburg	43° 37'	87°45'	IV	3.8
10/13/1956	South Milwaukee	42° 55'	87°52'	IV	3.8
1/8/1957	Beaver Dam	42° 32'	98°48'	IV	3.6
2/28/1979	Bill Cross Rapids	45° 13'	89°46'	--	<1.0 MoLg
1/9/1981	Madison	43° 05'	87°55'	II	--
3/13/1981	Madison	43° 37'	87°45'	II	--
6/12/1981	Oxford	43° 52'	89°39'	IV-V	--
2/12/1987	Milwaukee	42° 95'	87°84'	IV-V	--
2/12/1987	Milwaukee	43° 19'	87°28'	IV-V	--
6/28/2004	Troy Grove, IL	41° 46'	88°91'	IV	4.2

In an article (published in 2012) in the Milwaukee Journal-Sentinel:[57]

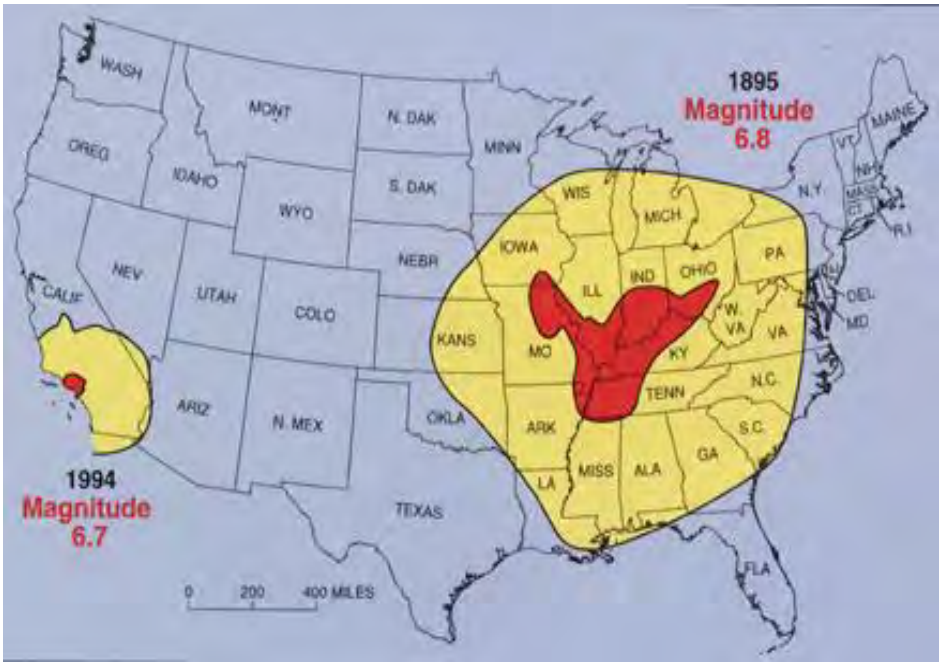
> *A 1.5-magnitude earthquake was recorded at 12:15 a.m. March 20 beneath Clintonville, according to the National Earthquake*

[57] http://www.jsonline.com/news/wisconsin/rumbling-booming-resumes-in-clintonville-6e4p9o8-144653925.html

> *Information Center. The center is operated by the U.S. Geological Survey.*
>
> *The U.S. Geological Survey said several days of booms and vibrations that rattled windows and nerves last week likely were caused by a swarm of small earthquakes.*
>
> *Scientists at the Wisconsin Geological and Natural History Survey in Madison said the low-intensity seismic activity could have been produced by a phenomenon known as postglacial rebounding.*
>
> *Granite bedrock beneath eastern Waupaca County is slowly adjusting to a great weight being lifted off it when the last glacier melted more than 10,000 years ago. As the granite stretches, rising only a few millimeters a year, it can crack to relieve pressure, according to David Hart, a geophysicist at the Wisconsin Geological and Natural History Survey.*
>
> *As it cracks, one piece slides or shifts places, releasing enough energy to create a seismic wave that rises to the surface.*
>
> *There is no known geologic fault beneath central Wisconsin so the postglacial rebounding is the only thing stretching the bedrock crust in the state, Hart said.*

This phenomenon was widely reported in local, state and national news and drew interest from the public.

The nearest major active fault is the New Madrid Fault, stretching along the central Mississippi River Valley in Missouri. In recent years, considerable attention has focused on seismic activity in the New Madrid seismic zone that lies within the central Mississippi Valley, extending from northeast Arkansas through southeast Missouri, western Tennessee and western Kentucky to southern Illinois. Scientists at the Center for Earthquake Information have computed a set of probabilities that estimates the potential for different magnitude earthquakes to occur at the New Madrid Fault. Even an 8.3 magnitude earthquake at the New Madrid Fault, however, would cause only minor damage in the southeastern corner of Wisconsin. At this time it is not possible to predict the exact date, duration or magnitude of an earthquake.


1895
Magnitude
6.8
1994
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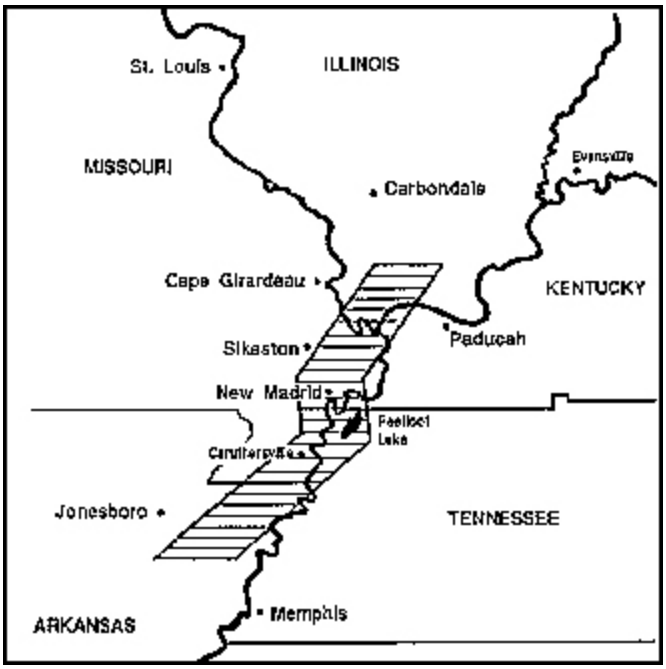
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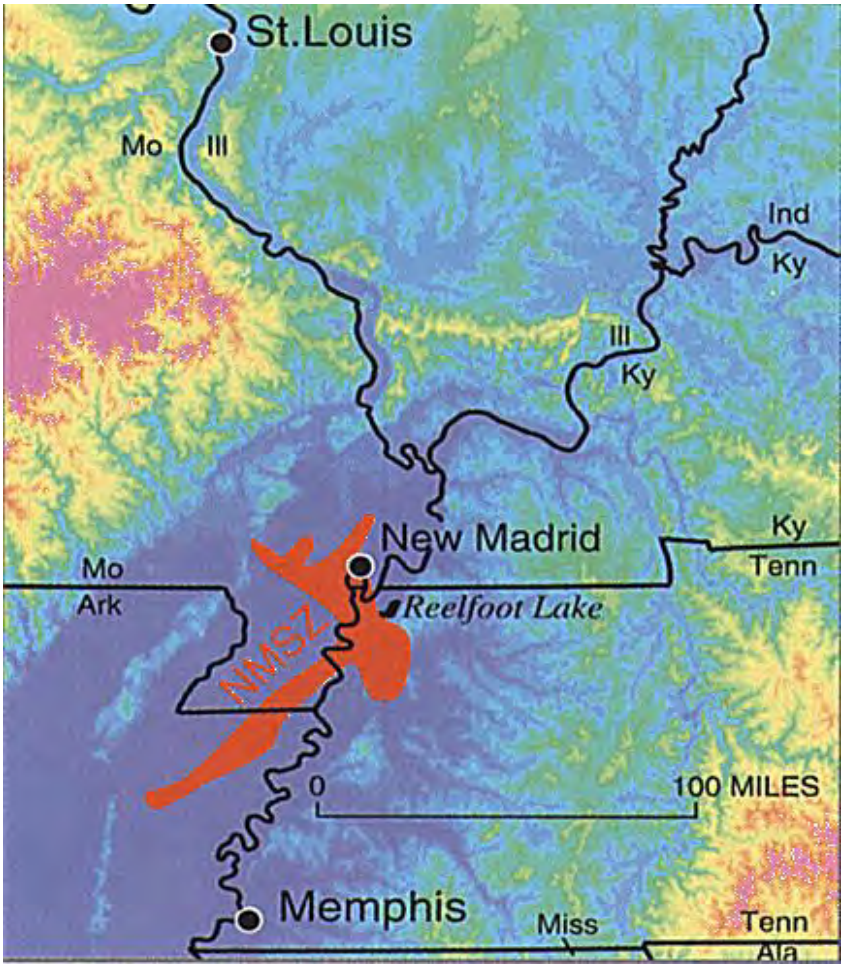
Memphis



As seen on the map in Appendix A, the earthquake threat to Richland County is considered very low (the 50-year acceleration probability is 2%.) Minor damage (e.g., cracked plaster, broken windows) from earthquakes has occurred in Wisconsin but most often the results have been only rattling windows and shaking ground. There is little risk except to structures that are badly constructed. Most of the felt earthquakes reported have been centered in other nearby states. The causes of these local quakes are poorly understood and are thought to have resulted from the still-occurring rebound of the earth's crust after the retreat of the last glacial ice. The likelihood of damage from an earthquake is also very low.

Vulnerability

Any impact in the community from earthquake would be county-wide and would likely be due to a few broken windows and personal effects

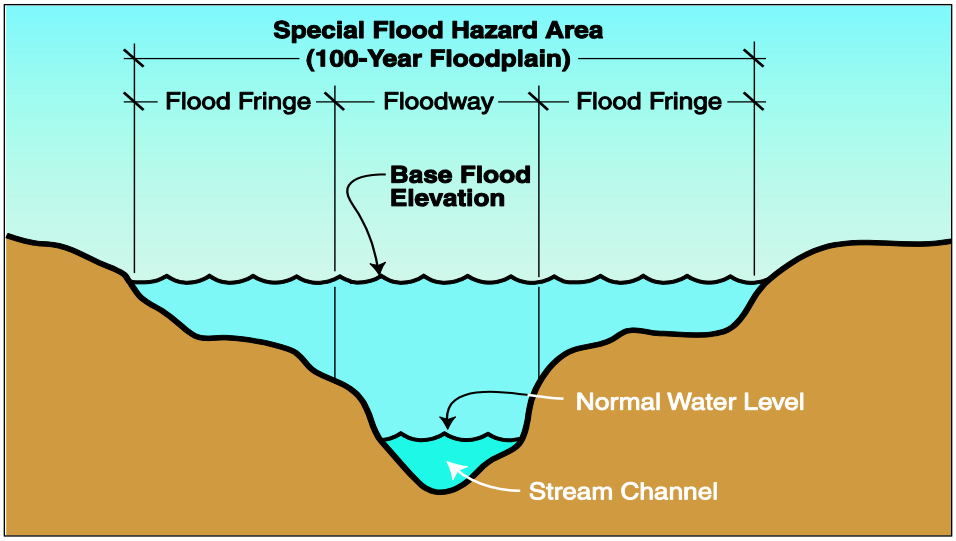
that fell in the earthquake. The damage to critical infrastructure and buildings would be negligible.

Hazard Mitigation Strategies

Since Richland County is not likely to suffer directly from a severe earthquake, the community impacts are not considered significant and mitigation planning for this hazard is not necessary. The goal for this section of the plan is therefore to educate on the very low risks of earthquake damage in Richland County.

Flooding and Dam Failure

Flooding is defined as a general condition of partial or complete inundation of normally dry land (i.e., the floodplains) caused by the overflow of inland waters or the unusual and rapid accumulation or runoff of surface waters from any source. Floodplains are the lowlands next to a body of water that are susceptible to recurring floods.[58]



Floods are common in the United States, including Wisconsin, and are considered natural events that are hazardous only when adversely affecting people and property.

Physical Characteristics

Major floods in Wisconsin have usually been confined either to specific streams or to locations that receive intense rainfall in a short period of time.

Flooding that occurs in the spring due to snow melt or during a period of heavy rain is characterized by a slow buildup of flow and velocity in rivers and streams over a period of days. This buildup continues until the river or stream overflows its banks, for as long as a week or two, then slowly recedes. Generally the timing and location of this type of flooding is fairly predictable and allows ample time for evacuation of people and property.

[58] FEMA, August 2001

For prediction and warning purposes, floods are classified by the National Weather Service into two types: those that develop and crest over a period of approximately six hours or more and those that crest more quickly. The former are referred to as "floods" and the latter as "flash floods". Flash flooding occurs solely from surface run-off that results from intense rainfall. Flash flooding occurs less frequently in Wisconsin than flooding associated with spring snow melt but it is unpredictable.

Richland County Flooding 2008[59]

Generally the amount of damage from flooding is a direct consequence of land use. If the ground is already saturated, stripped of vegetation or paved, the amount of run-off increases, adding to the flooding. There is also a concern regarding the loss of topsoil and erosion due to flooding.

Terms commonly used when referring to flooding are "100-year flood" and "flood plain." A "100-year flood" is defined as the flood water level that can be expected to occur or to be exceeded in magnitude in any given year.

[59] http://www.co.richland.wi.us/floodinfo/flood2008/slideshow/html/helper.htm

Flood Probability Terms Table[60]

Flood Recurrence Intervals	Percent Chance of Occurrence Annually
10 year	10.0%
50 year	2.0%
100 year	1.0%
500 year	0.2%

The Wisconsin Department of Natural Resource (DNR), working with local zoning offices, has designated flood plain areas as those places where there is the greatest potential for flooding. Flooding may also occur due to a dam breach or overflow. Dams are barriers built across a waterway to store, control, or divert water; a dam failure is a failure of the dam that causes downstream flooding. Failures may be caused by technological events (e.g., materials failure) or by natural events (e.g., landslide, earthquake) with flooding being the most common result.

Richland County has 155 small, uncontrolled agricultural dams included in the Wisconsin Department of Natural Resources (DNR) database:

Dam Official Name	Type	Latitude	Longitude	Owner Type	Waterway Name
PARFREY	LARGE	43.33552	-90.39138	CITY	PINE
RODOLF	LARGE	43.2235529	-90.4662658	VILL	MILL CREEK
CAZENOVIA	LARGE	43.5253504	-90.1962239	VILL	LITTLE BARABOO R
MILL CREEK 3	LARGE	43.33387	-90.57271	LCD	CORE HOLLOW CREEK
MILL CREEK 1B	LARGE	43.3665249	-90.4963991	LCD	CREEK 9 6 TR EAST BRANCH MILL
MILL CREEK 13A	LARGE	43.38228	-90.50309	LCD	EAST BRANCH MILL CREEK
MILL CREEK 13B	LARGE	43.39135	-90.4974	LCD	TR EAST BRANCH MILL CREEK
MILL CREEK 10	LARGE	43.45369	-90.56542	LCD	CREEK 11 16 TR MILL CREEK
MILL CREEK 22	LARGE	43.4069852	-90.6116748	LCD	TR WEST BRANCH MILL CREEK
SCHOLTEN	LARGE	43.2303176	-90.3614392	PRIV	TR WISCONSIN
BERNS, DANIEL	SMALL	43.3603423	-90.2118889	PRIV	SPRING FLOW

[60] State of Wisconsin Hazard Mitigation Plan

Dam Official Name	Type	Latitude	Longitude	Owner Type	Waterway Name
HUFFMAN BROTHERS	LARGE	43.4480658	-90.3777808	PRIV	FROM JACQUISH HOL TR-WEST BRANCH PINE
BRIMSTONE GROUP	LARGE	43.2358061	-90.5294261	PRIV	TR-WISCONSIN RIVER
MEINHARDT	LARGE	43.4607938	-90.2983422	PRIV	TR-HAWKINS CREEK
PETERSON	LARGE	43.2497691	-90.5539983	PRIV	TR-STREAM 24-9
BERNSTEIN	LARGE	43.3925912	-90.4578401	PRIV	TR-HORSE CREEK
BARRETT	LARGE	43.38399	-90.5754	PRIV	NON-NAV TRIB TO W.BR.MILL CR.
CALHOUN	LARGE	43.5303833	-90.3249362	PRIV	NO WATERWAY
CRUSON SLOUGH	LARGE	43.1932059	-90.2394625	DNR	TR-WISCONSIN RIVER
MOTT	LARGE	43.4099522	-90.283935	PRIV	TR-WHEAT HOLLOW CREEK
JORDON #1	LARGE	43.4650178	-90.2801378	PRIV	TR-HAWKINS CREEK
JORDON #2	LARGE	43.46215	-90.28454	PRIV	TR-HAWKINS CREEK
JORDAHL	LARGE	43.4608027	-90.3658489	PRIV	UNNAMED
NORTH PORK MANURE PIT	LARGE	43.45052	-90.54525	PRIV	COULTER HOLLOW CR
MIKE MEREDITH	SMALL	43.2435487	-90.5335189	PRIV	BRIMSTONE HOLLOW CREEK
ITHACA MILL	SMALL	43.3412656	-90.2866741	PRIV	WILLOW CREEK
BAMBOS, IRWIN J.	SMALL	43.213158	-90.3069855	PRIV	GULLEY
BENTON, WILLIAM	SMALL	43.3574723	-90.5635674	PRIV	TR-W.BRANCH MILL CREEK
BLANCHARD,LEIGHTON	SMALL	43.3698832	-90.3484487	PRIV	TR-9-9 TRIBUTARY
BROKOP,ALFRED	SMALL	43.513731	-90.2451371	PRIV	TR-BAUER VALLEY CREEK
BUTTON, DICK	SMALL	43.2898293	-90.4565453	PRIV	GULLY
CARROLL, DANIEL J	SMALL	43.4732253	-90.3437923	PRIV	TR-SOULES CREEK
DEITZ, ROBERT	SMALL	43.4773757	-90.3681994	PRIV	TR-PINE RIVER
DANIELS, PATRICK	SMALL	43.5293777	-90.2830843	PRIV	TR-CAZENOVIA BRANCH CREEK
DEFILLIPPO, LOUIS	SMALL	43.4741418	-90.4729857	PRIV	TR-BLOOM 26-9
DENNIS, JACK	SMALL	43.3047669	-90.5378016	PRIV	GULLY
DUERKSEN, BARBARA	SMALL	43.4622382	-90.516141	PRIV	GULLY
EL PAC RANCH INC NO.1	SMALL	43.4358212	-90.5504816	PRIV	MILL CREEK
EL PAC RANCH INC NO.2	SMALL	43.4354062	-90.5512217	PRIV	MILL CREEK
FARNSWORTH, WALLACE	SMALL	43.44754	-90.5125504	PRIV	TR-FANCY CREEK
FIEDLER, RICHARD	SMALL	43.3368689	-90.347019	PRIV	TR-SPRING CREEK
FRUIT, GARLAND	SMALL	43.3938353	-90.4517826	PRIV	GULLY
HENRY, RAYMOND NO.1	SMALL	43.4395523	-90.4002317	PRIV	NOT A WATERCOURSE
HENRY, RAYMOND NO.2	SMALL	43.4400097	-90.4008147	PRIV	TR-ROCK RIDGE 15-7
HOUSNER, R.E.	SMALL	43.4691763	-90.3562085	PRIV	TR-PINE RIVER
JERRETT, GARY	SMALL	43.552389	-90.2836832	PRIV	NON- NAV TR. CAZENOVIA

Dam Official Name	Type	Latitude	Longitude	Owner Type	Waterway Name
					BRANCH
JOHNSON, ROGER	SMALL	43.5252629	-90.5877698	PRIV	TR-CAMP CREEK
KADERAVEK,JOHN	SMALL	43.4733302	-90.2092309	PRIV	TR-WILLOW
KENN, EDWARD	SMALL	43.5265092	-90.2353477	PRIV	NOT A WATERCOURSE
MILLER, CECIL K.	SMALL	43.5412472	-90.6261875	PRIV	GULLY
MURPHY, JOHN	SMALL	43.3984456	-90.5633217	PRIV	TR-PINE VALLEY CREEK
NACHTIGAL, JAMES	SMALL	43.5226469	-90.4352266	PRIV	TR-PINE RIVER
OATES, HOWARD	SMALL	43.4073367	-90.6555302	PRIV	TR-KNAPP CREEK
OLSON, DARRELL	SMALL	43.2615422	-90.318569	PRIV	GULLY
PETERSEN,LORENZ	SMALL	43.3660866	-90.3245009	PRIV	WILLOW CR.
REIMANN, CARL	SMALL	43.243951	-90.4148502	PRIV	GULLY
ROHN, WILLIAM JR.	SMALL	43.4141459	-90.3837139	PRIV	TR-PINE RIVER
KAUFFMAN,JOHN	SMALL	43.3871946	-90.5253758	PRIV	BR MILL CREEK
ROBB, JAMES G	SMALL	43.416497	-90.2435687	PRIV	TR-WILLOW CREEK
ANDERSON,HARDEN NO.1	SMALL	43.2735104	-90.5403476	PRIV	TR-MILL CREEK
ANDERSON,HARDEN NO.3	SMALL	43.2690626	-90.5349659	PRIV	DRY RUN
ANDERSON, LAVAUGHN	SMALL	43.5336959	-90.4498583	PRIV	TR-PINE RIVER
BARTH,JOHN H.	SMALL	43.4752308	-90.3502536	PRIV	TR-SOWLES CREEK
BENNETT,MARTIN	SMALL	43.5087215	-90.4504504	PRIV	UNNAMED STREAM
BERNS,DANIEL	SMALL	43.5429721	-90.6200444	PRIV	TR-GOOSE CREEK
BLOOD,CHARLIE W.	SMALL	43.4564974	-90.4022881	PRIV	TR-WEST BRANCH PINE RIVER
BRIDGEMAN,R.J.	SMALL	43.2319073	-90.5077495	PRIV	TR-WISCONSIN RIVER
CAMPBELL,RODERICK	SMALL	43.4931669	-90.3556293	PRIV	TR-MELANCTHON CREEK
COOPER,GERALD	SMALL	43.382332	-90.3374551	PRIV	TR-BUCK CREEK
DAHL, ARTHUR H.	SMALL	43.4646995	-90.5914547	PRIV	TR-MILL CREEK
EWING, LEE	SMALL	43.2942702	-90.401154	PRIV	TR-ASH CREEK
FARNSWORTH, WALLACE	SMALL	43.4473099	-90.5144531	PRIV	TR-FANCY CREEK
FUHLBRUGGER, HENRY	SMALL	43.5226171	-90.4732714	PRIV	TR-WEST BRANCH-PINE RIVER
GEIMER, ROBERT J.	SMALL	43.4214331	-90.5642427	PRIV	TR-MILL CREEK
GOMER, ROBERT	SMALL	43.4015999	-90.3391615	PRIV	INTERMITTENT STREAM
GRASSMAN,LOUIS J.	SMALL	43.3814738	-90.2497085	PRIV	TR-WILLOW CREEK
JORDAHL, HAROLD	SMALL	43.4668929	-90.414626	PRIV	TR-WEST BRANCH PINE RIVER
MARONIC,JOHN	SMALL	43.5322673	-90.4522552	PRIV	TR-PINE RIVER
MOE, GILMAN	SMALL	43.4419732	-90.2381059	PRIV	NON-NAV TRIB. TO WILLOW CR.
OLER,LLOYD	SMALL	43.3622639	-90.3139041	PRIV	WILLOW CR.
PITTMAN,ROBERT	SMALL	43.3614894	-90.4585438	PRIV	TR-BRUSH

Dam Official Name	Type	Latitude	Longitude	Owner Type	Waterway Name
					CREEK
REED, ROBERT	SMALL	43.5006203	-90.6579258	PRIV	TR-KICKAPOO RIVER
RIPLEY,CLIFFORD	SMALL	43.4067493	-90.2287936	PRIV	TR-WILLOW CREEK
RUDERSDORF, RAY	SMALL	43.2890405	-90.4722319	PRIV	TR-ASH CREEK
SCHWARTING,WILLIAM	SMALL	43.3763293	-90.3377312	PRIV	TR-PINE RIVER
SOMMER JR, EUGENE	SMALL	43.306467	-90.4721843	PRIV	TR-HOOSIER HOLLOW CREEK
STRAIGHT, BEN	SMALL	43.3826947	-90.4154353	PRIV	TR-HORSE CREEK
SYMONS, JOHN	SMALL	43.4299697	-90.5055546	PRIV	UNNAMED
ZIETZ, FRED	SMALL	43.4302801	-90.4208648	PRIV	NO WATERWAY
KOOIMAN, DIRK	SMALL	43.4295478	-90.2622066	PRIV	UNNAMED
BREWER,V.W.	SMALL	43.4391032	-90.353884	PRIV	TR-PINE RIVER
HOUSNER, DR.R.E.	SMALL	43.4652537	-90.3555251	PRIV	TR-PINE RIVER
GROH, RUPERT	SMALL	43.3501686	-90.5282821	PRIV	TR-MILL CREEK
WASHO,NORMAN	SMALL	43.4980617	-90.3510075	PRIV	TR MALANCTHON CREEK
DAVIS, CORY	SMALL	43.3281389	-90.4287242	PRIV	CENTER CREEK
BROWN,DEWEY	SMALL	43.4620078	-90.4253587	PRIV	TR WEST BR PINE RIVER
FISK, LLOYD	SMALL	43.4029382	-90.3091914	PRIV	TR LITTLE WILLOW RIVER
ROVELSTAD,STAN	SMALL	43.4253608	-90.5296766	PRIV	TR MILL CREEK
DONNELY, JAMES J	SMALL	43.4650778	-90.4521052	PRIV	TR WEST BRANCH PINE RIVER
MILL CREEK 6	SMALL	43.4110593	-90.6082606	PRIV	WEST BRANCH-MILL CREEK
TAVE,STUART M.	SMALL	43.3619718	-90.6607367	PRIV	KNAPP CREEK
BOWEN, FRANK	SMALL	43.3740191	-90.3828588	PRIV	PINE RIVER
HALINK, ALLEN	SMALL	43.3249591	-90.4584731	PRIV	GULLY TO BRUSH CREEK
PITTMAN, ROBERT & LICK, MORSE	SMALL	43.3519596	-90.4612908	PRIV	GULLY TO BRUSH CREEK
PITTMAN, R. AND BUROKER, E.	SMALL	43.345756	-90.4608646	PRIV	GULLY TO BRUSH CREEK
GOPLIN, DONALD	SMALL	43.3331092	-90.4387611	PRIV	GULLY TO BRUSH CREEK
HUTH, CARL	SMALL	43.3572691	-90.465544	PRIV	GULLY TO BRUSH CREEK
HENRY,RAY	SMALL	43.4382316	-90.3986519	PRIV	TR-PINE
LOUIS, JOHN	SMALL	43.31486	-90.2607762	PRIV	TR WILLOW CR.
ROHN, CLARENCE	SMALL	43.2659885	-90.2666448	PRIV	TR-PINE
WILLIAMS-KINNEY	SMALL	43.2729085	-90.6453573	PRIV	TR-KNAPP CR
ANDERSON, JOYCE	SMALL	43.5353379	-90.6403782	PRIV	GULLY TO GOOSE CK
WALTHER, LEVI	SMALL	43.3266128	-90.5748112	PRIV	GULLY TO CORE HOLLOW CREEK
WILSON, CHARLES	SMALL	43.4646373	-90.5074144	PRIV	UNNAMED TRIB TO FANCY CREEK
ACCOMANDO, FRANK	SMALL	43.3087135	-90.5042134	PRIV	TR-FOX HOLLOW CR
UNBEHAUM, JOHN	SMALL	43.3792337	-90.4518458	PRIV	TR-HORSE CR
BERGMAN, FRED	SMALL	43.4002244	-90.3161348	PRIV	TRIB. TO LITTLE WILLOW CR.

Dam Official Name	Type	Latitude	Longitude	Owner Type	Waterway Name
KELLER, ALEXANDER	SMALL	43.340635	-90.4443038	PRIV	TRIB TO BRUSH CREEK
SEBRANEK,LARRY	SMALL	43.2382044	-90.2245628	PRIV	BEAR CREEK
FRUIT,GARLAND	SMALL	43.3954154	-90.4618842	PRIV	HORSE CREEK
TRIGGS, JOE	SMALL	43.3857058	-90.4990966	PRIV	GULLY TO MILL CREEK
SEEP, WILLIAM	SMALL	43.486912	-90.2732025	PRIV	TRIB. HAWKINS CREEK
CHITWOOD, RUBY	SMALL	43.2260846	-90.5852395	PRIV	WISCONSIN RIVER
STAFFORD, RAYMOND	SMALL	43.3440731	-90.3218589	PRIV	
SCOVILLE, LEVI	SMALL	43.5498434	-90.3385187	PRIV	RICHARDSON HOLLOW CREEK
ANDERSON, FAYE NO.1	SMALL	43.4070752	-90.2991398	PRIV	GULLY
ANDERSON, FAYE NO.2	SMALL	43.4012663	-90.2987216	PRIV	GULLY
ANDERSON, FAYE NO.3	SMALL	43.40866	-90.30376	PRIV	GULLY
ANDERSON, FAYE NO.4	SMALL	43.4076726	-90.3009386	PRIV	GULLV
HUEBSCH	SMALL	43.3492709	-90.209021	PRIV	PUMPKIN HOLLOW CREEK (NON NAV
FLICKINGER	SMALL	43.5081578	-90.6574094	PRIV	TRIB KICKAPOO R
STANFORD KIM WILLIAMS POND	SMALL	43.5180522	-90.3912352	PRIV	PINE R. - TRIB
PAVLOVIC	LARGE	43.5112896	-90.6076048	PRIV	CAMP CR TRIB - UNNAMED
JUDSON DAM	SMALL	43.5086214	-90.3555151	PRIV	JUDSON SPRING
LOOMIS, NEIL	SMALL	43.4604281	-90.4931315	PRIV	TRIB OF FANCY CREEK
RICHLAND CENTER		43.3491384	-90.385853	CITY	
WILSON DAM	SMALL	43.4606622	-90.6406629	PRIV	
SPENCER DAM	SMALL	43.4498712	-90.2114121	PRIV	
LUTTIG DAM	SMALL	43.3762698	-90.4941903	PRIV	
BAILEY DAM	SMALL	43.4042991	-90.4288077	PRIV	TRIB TO FANCY CREEK
DUREN'S MILL DAM		43.5208045	-90.2175379		LITTLE BARABOO RIVER
EXCELSIOR DAM		43.253729	-90.6088536		KNAPP CREEK
TWIN BLUFFS DAM		43.2801884	-90.3036565		WILLOW CREEK
CAMP CREEK DAM		43.4978249	-90.7690742		CAMP CREEK
BOAZ DAM		43.3304327	-90.5279147		MILL CREEK
YUBA DAM		43.5285573	-90.4200956		WHITE PINE RIVER
LONE ROCK MILLS DAM		43.2054858	-90.2358465		BEAR CREEK
GREENE	SMALL	43.4489715	-90.2105038	PRIV	
MILL CREEK 9A	LARGE	43.44162	-90.57774	LCD	MILL CREEK OFFSTREAM
SEBRANEK,LARRY	SMALL	43.2310541	-90.2272194	PRIV	BEAR CR.
SPEAR, DR J.I.	SMALL	43.36623	-90.3664	PRIV	TR-PINE RIVER
CUNNINGHAM, JAMES	SMALL			PRIV	U/N TRIB TO LITTLE BARABOO R
ALBRECHT, RICHARD DAM	SMALL	43.3915571	-90.3374431	PRIV	U/N TRIB. TO PINE RIVER
FAIRBROTHER, MERWIN	SMALL	43.4572621	-90.4134081	PRIV	U/N TRIBUTARY TO W BR. PINE R

Dam Official Name	Type	Latitude	Longitude	Owner Type	Waterway Name
HOFFMAN, JOHN		43.3775589	-90.6125104	PRIV	U/N TRIB. TO W. BR. MILL CR

Most of these dams are small, mill-type dams under the jurisdiction of the DNR, municipalities and are also privately owned. None of these dams could handle the volume of water generated by a 100- or 500-year flood without overtopping. These dams are inspected by the Wisconsin Department of Natural Resources (DNR) and the largest are required to have an Emergency Action Plan (EAP) and failure analysis on them. There are no dams in other counties that pose a significant flooding risk to the citizens of Richland County.

One potential effect of flooding is erosion. Erosion is defined as the removal of soil by the force of waves, currents and/or ice at a lakeshore or streambank or by the power of wind or water on open land. Erosion is a natural process that can be accelerated by natural disasters (e.g., flooding, heavy rains, strong winds, drought) or by human activity (e.g., removal of plants/trees, tilling.) Because of the many waterways in Richland County, there is concern about ensuring the stabilization of the shorelines.

Watersheds[61]

Richland County has seven watersheds. The maps in Attachment D show the hydrologic profile and the 100-year flood plains for the entire county. Following is a brief description of each watershed:

Middle Kickapoo River

The Middle Kickapoo River Watershed is located in central Vernon County but it also includes portions of south central Monroe County and northwest Richland County. This watershed includes all streams that flow to the Kickapoo River between Ontario and Readstown. The topography of the Middle Kickapoo River Watershed is quite severe with steep wooded hillsides and narrow valleys which limits the majority of farmland in this watershed to the ridgetops. Only a small portion of the Middle Kickapoo River Watershed contains wetlands and they are concentrated along the Kickapoo River, Weister Creek and Warner Creek. An abundance of trout streams drain this watershed.

[61] http://dnr.wi.gov/org/gmu/lowerwis/watersheds.htm

Recently the section of the Kickapoo River in this watershed was classified as Class II trout.

Upper Pine River Watershed

The 188.5 square mile Upper Pine River watershed lies mostly in north central Richland County with a small portion in Vernon County. Streams in the watershed have a high gradient and water quality is generally good. Nearly all of the streams in the watershed are cold water streams and can support trout and other cold water species. Like other watersheds in the Lower Wisconsin Basin, agriculture is the dominant land use in the watershed. Currently, the overall trend in Richland County is from intensive agriculture to hobby farming. The exception to this transition in land use is near the upper end of the Pine River. There are few wetland complexes in the watershed. Many of them are wet meadows adjacent streams that have been degraded by grazing or cultivation. One exception to this is a northern bog wetland complex near Hub City. This type of wetland is very rare in this part of the state.

Crossman Creek and Little Baraboo Watershed

The Crossman Creek and Little Baraboo River Watershed lies in northwestern Sauk County, southern Juneau County, northeastern Richland County and the southeast corner of Vernon County. It is also in the driftless, or unglaciated, region of Wisconsin. The dominant land use in the watershed is agriculture. Forest and grassland also cover a large portion of the watershed.

Knapp Creek Watershed

The Knapp Creek watershed covers approximately 154 square miles and is located in the driftless area of western Richland and eastern Crawford counties. There are no major municipalities in the watershed and overall population in 2000 was estimated to be fewer than 2,000. Most of the streams in the watershed drain to Knapp Creek. Knapp Creek empties into the Wisconsin River above Boscobel. Land cover in the watershed is mostly broad leaf deciduous forest, although a large portion of the watershed is used for agricultural production.

Mill and Indian Creek Watershed

This watershed is located in the unglaciated, or driftless, area of the state. Most of the streams in the watershed are tributary to Mill Creek which flows into the Wisconsin River by Muscoda. Many of these tributaries, particularly above Boaz, are trout streams. As with other watersheds in the basin, land use is predominately agricultural. Away from the Wisconsin River, wetlands are few and many of them have been grazed or cultivated. The only municipality in the watershed is the village of Boaz.

Willow Creek Watershed

The Willow Creek Watershed covers 160.5 square miles in Richland County. The watershed is within the driftless, or unglaciated, part of Wisconsin and major water resources in the watershed are Willow Creek and the section of the Pine River from Brush Creek at Richland Center downstream to the Wisconsin River. Richland Center is the main municipality in the watershed. Land cover in the watershed is primarily broad-leaf deciduous forest and agriculture. There are few wetland complexes in the watershed away from the Wisconsin River floodplain. These are usually adjacent streams and suffer from the effects of grazing or cultivation. There are some locally important, relatively undisturbed wetlands at the junctures of some of the larger streams.

Bear Creek Watershed

The Bear Creek watershed drains 126.5 square miles. Bear Creek, the main water resource in the watershed, drains to the Wisconsin River in southeastern Richland and southwestern Sauk counties. The southern portion of watershed lacks surface water features. Much of the

watershed is in the driftless, or unglaciated, area of the state. The largest municipalities in the watershed are Lone Rock and Spring Green. The largest percentage of land cover in the watershed is broadleaf deciduous forest. Agriculture, particularly dairying, is the largest land use in the watershed. There are significant grassland, forest land and wetlands in the watershed. These small wetland complexes are typically wet meadows and are adjacent to the streams in the watershed. Some of the wetlands are locally significant for waterfowl as well as for other wildlife species.

Floodplain Regulations

Floodplain regulations have been in place in the cities, towns and villages of Richland County for many years. The Wisconsin Department of Natural Resources (DNR) requires that each municipality approve regulations that meet DNR guidelines. These regulations and guidelines result from the value of Wisconsin lakes and waterways and a desire to preserve them and to protect the people who reside near them. Unregulated development can lead to loss of lives and property during floods.

Chapter 614, Laws of Wisconsin 1965, requires counties to adopt regulations giving all lands within 300 feet of navigable rivers or streams protection from haphazard development. Under this legislation, Richland County has adopted a zoning ordinance which gives a measure of protection to watersheds. The law protecting flood plains was created to meet the following objectives:

- Reduce the hazards to life and property from flooding.
- Protect flood plain occupants from a flood which is or may be caused by their own land use, which is or may be undertaken without full realization of the danger.
- Protect the public from the burden of extraordinary financial expenditures for flood control and relief.

Encroachment on floodplains, including structures or fill, reduces the flood-carrying capacity.

Frequency of Occurrence

Wisconsin has experienced several major floods during the last two decades. Flood history has revealed that no flood plains or urban areas in Wisconsin can be considered safe from damages. Mill dams have developed leaks on occasion but have not caused any flooding problems.

As is seen by a review of the historical records, flooding can occur throughout most of Richland County but the most severe issues have occurred along the Wisconsin and Pine Rivers. Richland County has been included in nine Presidential Disaster Declarations requests for flooding, the most recent of which are detailed below:

- FEMA-1236-DR-WI: On July 24, 1998 the President declared a major disaster as a result of Severe Storms, Straight-Line Winds, Tornadoes, Heavy Rain and Flooding. Richland County received Public Assistance (PA) only.
- FEMA-1332-DR-WI: On July 23, 2000 the President declared a major disaster as a result of severe storms, tornadoes and flooding occurring from May 26, 2000 – July 19, 2000. Richland County received PA and Individual Assistance (IA).
- FEMA-1526-DR-WI: On June 19, 2004 the President declared a major disaster as a result of severe storms and flooding occurring from May 7, 2004 – July 3, 2004. Richland County received IA only.
- FEMA-1719-DR-WI: On August 26, 2007 the President declared a major disaster as a result of severe storms, tornadoes and flooding occurring from August 18-31, 2007. Richland County received IA & PA.
- FEMA-1768-DR-WI: On June 14, 2008 the President declared a major disaster as a result of severe storms, tornadoes and flooding occurring from June 5 – July 25, 2008. Richland County received IA & PA.

Following is a table with the flood events recorded by the National Weather Service between 1 January 1950 and 31 January 2016:[62]

[62] http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=55%2CWISCONSIN

Date	Location	Type	Death/Injury	Property Damage	Crop Damage
5/3/1993	Richland	Flood	Death/Injury: 0	5K	5K
2/20/1994	Viola	Flood	Death/Injury: 0	0	0
6/16/1996	Rockbridge	Flash Flood	Death/Injury: 0	250K	200K
3/30/1998	Richland Center	Urban/sml Stream Fld	Death/Injury: 0	0	0
6/27/1998	Richland Center	Flash Flood	Death/Injury: 0	15K	0
6/28/1998	Countywide	Flood	Death/Injury: 0	0	25K
6/10/1999	Southeast Portion	Flash Flood	Death/Injury: 0	25K	40K
5/31/2000	Countywide	Flash Flood	Death/Injury: 0	45K	30K
6/1/2000	Countywide	Flood	Death/Injury: 0	400K	140K
7/26/2000	North Portion	Flash Flood	Death/Injury: 0	30K	15K
5/8/2002	Richland Center	Flash Flood	Death/Injury: 0	4K	0K
7/6/2002	West Portion	Flash Flood	Death/Injury: 0	1K	3K
5/21/2004	Countywide	Flash Flood	Death/Injury: 0	75K	50K
5/23/2004	Countywide	Flash Flood	Death/Injury: 0	30K	35K
8/18/2007	Richland Center	Flash Flood	Death: 1 Injury: 0	8.8M	300K
8/19/2007	Viola	Flood	Death/Injury: 0	150K	50K
8/19/2007	Yuba	Flash Flood	Death/Injury: 0	750K	25K
8/19/2007	Richland Center	Flood	Death/Injury: 0	100K	50K
6/7/2008	Cazenovia	Flash Flood	Death/Injury: 0	1.1M	1.0M
6/8/2008	Viola	Flood	Death/Injury: 0	2.2M	1.0M
6/8/2008	Sand Prairie	Flood	Death/Injury: 0	2.4M	1.0M
6/12/2008	Sand Prairie	Flash Flood	Death/Injury: 0	28K	3K
6/23/2010	Buck Creek	Flash Flood	Death/Injury: 0	3K	0K

7/15/2010	Viola	Flash Flood	Death/Injury: 0	10K	0K
8/9/2010	Yuba	Flood	Death/Injury: 0	0K	0K
8/13/2010	Viola	Flood	Death/Injury: 0	0K	0K
8/13/2010	Yuba	Flood	Death/Injury: 0	0K	0K
6/22/2013	Travera	Flash Flood	Death/Injury: 0	0K	0K
7/15/2013	Lone Rock	Flash Flood	Death/Injury: 0	291K	0K
4/12/2014	Tri County Airport	Flood	Death/Injury: 0	0K	0K
4/13/2014	Orion	Flood	Death/Injury: 0	0K	0K
6/29/14	Orion	Flash Flood	Death/Injury: 0	0K	0K
6/29/14	Twin Bluffs	Flash Flood	Death/Injury: 0	0K	0K

The following list summarizes damages attributed to flooding in Richland County by the National Flood Insurance Program through 28 February 2014.

Richland County NFIP Loss Claims[63]

Jurisdiction	Total Loss	Closed Loss	Closed Without Payment	Total Payments
Village of Lone Rock	1	1	0	$ 4,559.30
City of Richland Center	26	15	11	$ 165,698.22
Richland County	27	22	5	$ 165,550.24
Village of Viola	23	21	2	$259,194.43
Village of Yuba	4	3	1	$ 34,072.59

Following is the number of repetitive loss properties, by jurisdiction, through 28 February 2014. All properties are single-family residential structures.

[63] http://bsa.nfipstat.fema.gov/reports/1040.htm

Site	Dates of Loss	Building Claim ($)	Contents Claim ($)
S. Grove St. Richland Center	8/19/2007 6/9/2008	$13,541.65	$0.00
STH 80 Richland Center	8/18/2007 6/8/2008	$39,218.73	$0.00
CTH E Muscoda	9/14/1992 6/1/2000 8/19/2007	$52,886.43	$25,670.28
CTH D Cazenovia	8/19/2007 6/7/2008	$9,519.22	$0.00
W. Turner Ave. Viola	8/18/2007 6/8/2008	$79,807.14	$0.00

A careful review of the geography and history of flooding in Richland County leads to the conclusion that there is a moderate probability of flooding in the future and a very high probability of damage and losses due to flooding. This flooding could occur due to urban stream flooding, flash flooding, or, less likely, due to a dam failure.

Vulnerability

After flooding, whether caused by a storm or dam failure, there is often damage. Potential vulnerabilities due to flooding events can include flooded public facilities and schools, many of which are the community's shelters needed when individual housing is uninhabitable. Utilities are also vulnerable in floods, which can bring down electric lines/poles/transformers, telephone lines and can disrupt radio communications. The loss of communications can impact the effectiveness of first response agencies, which need to communicate via two-way radio to mount emergency response and recovery activities. The public media communications utilized by emergency managers to provide timely and adequate emergency public information can also be impacted.

Residential structures may suffer from flooded basements, damaged septic systems and damaged functionals (e.g., HVAC systems, clothes washers and driers). Homes may also be impacted by sewer back-up and, if the home is not properly cleaned after a flood, bacterial growth and mold may impact the home's air quality and cause illness among the occupants.

Businesses can suffer building and equipment damage similar to homes. Businesses may lose expensive product stored in basement or other low areas as well as the ability to operate from their facility. If the facility must close, its owners and employees will most likely suffer economic hardships beyond what their personal losses may have entailed. Agricultural business losses involve the loss of standing crops and harvests that are damaged by flooded storage facilities in the immediate time period. On a longer time scale, the erosion of rich topsoil by floodwaters can degrade the land and impact future crop yields.

Perhaps one of the most expensive types of flood damage is that to roadways, which are washed out, inundated and/or covered by debris, blocking access to emergency and general public traffic.

Richland County flooding, June, 2008.

Richland County sustained several major flooding events causing more than $9 million in flood-related damage in 2007. The extensive flood damage in 2008 impacted over 275 homes that became eligible for Individual and Households Program (IHP) aid worth approximately $825,000.

The Wisconsin Hazard Mitigation Plan estimates that 49 of a total of 7,221 buildings will receive damage in Richland County for a total economic loss of $47,598M and a building loss of $19,157M. Of the

buildings with damage, two will be critical infrastructure (schools). They also project that 335 people will need short-term sheltering as a result of flooding.

Hazard Mitigation Strategies

The purpose of the flood mitigation portion of the plan is to identify areas that are particularly susceptible to flooding, assess the risks, analyze the potential for mitigation and recommend mitigation strategies where appropriate. With that in mind, the plan goals are:

- Goal 1: To reduce, in a cost effective manner using a cost-benefit analysis, the loss of lives and property due to these events. Another part of this goal is to promote safety and health in areas that have been or are prone to be flooded.
- Goal 2: To preserve and enhance the quality of life throughout Richland County by identifying potential property damage risks and recommending appropriate mitigation strategies to minimize potential property damage during/due to flooding.
- Goal 3: To promote countywide planning that avoids transferring the risk from one community to an adjacent community.
- Goal 4: To encourage all communities in Richland County to participate in the NFIP so that all county residents have access to affordable flood insurance coverage.
- Goal 5: To identify potential funding sources for mitigation projects and form the basis for project grant applications through FEMA's Pre-Disaster Mitigation (PDM) and/or Flood Mitigation Assistance (FMA) programs.

Richland County and the following municipalities are committed to remaining compliant with the requirements of the National Flood Insurance Program (NFIP) and all other state and federal laws. The Village of Cazenovia is not mapped and is currently not compliant with the NFIP but continues to work on becoming compliant. According to the NFIP, the following communities participate in the program.

- Richland County
- City of Richland Center
- Village of Boaz
- Village of Lone Rock

- Village of Viola
- Village of Yuba

Richland County has a history of damage to buildings and infrastructure due to floods. Short-term actions that can lessen the effects of flooding include:

- Issuance of early warnings through flood advisory bulletins,
- Dissemination of instructions to the public through the media.
- Preparation of congregate care facilities.
- Evacuation of people and property.

Temporary protective measures such as sandbagging, protection of buildings and other structures and cut-off of gas and electricity may also be implemented.

The current emphasis in flood mitigation is on long-range actions. Such actions include the adoption of proper floodplain zoning ordinances and land-use planning. The county and its municipalities use their comprehensive plans as a blueprint for how the community will develop and grow.

Richland County can make current and future buildings and infrastructure more disaster-resistant by employing the following strategies:

- Inform the public about the availability of flood insurance; this task will be carried out by the County Emergency Management Office.
- The Village of Cazenovia, as noted above, is not currently a participating community in the National Flood Insurance Program (NFIP). The Village, with the assistance of Richland County Emergency Management, will continue to work with FEMA to become compliant with the program.
- Continue increasing the county's GIS mapping capabilities which are used for vital purposes such as emergency planning and response, government decision-making and sound land use policy development. Upcoming main projects are updating the FIRM panels and keeping data current as well as setting lot corners so that parcels are more correct.

- Train and exercise on the plans for the five county-owned dams. The county completed review of the five county-owned dams and integrated the information into the EOP.

- Continue disseminating public information materials related to flooding via placing printed information in racks and adding links to the webpage. This would include placing a link on the website that that will show the monitoring of the ground water level at the Koch well,[64] which is a fairly reliable predictor of local flooding.

- Explore the feasibility of purchasing and installing flood gauges on the Pine River (buy one and upgrade two) and on Mill Creek (buy two). The paths of these two waterways affect many of the municipalities in the county and when they overflow, roads and residents are affected. The Village of Viola currently has a manual-read gauge and would like to stay with that. The County would eventually like to install automatic gauges that could be monitored remotely via a website. This website would be linked to the county's preparedness page to make the information available to all residents. CDBG funding was received but the contractor was unable to complete the project so the money was reallocated to moving the community center from the floodplain. The project is being carried forward to seek funding.

- Richland County has a history of expensive damage to buildings and infrastructure due to floods. In addition to the strategies listed above that deal with public information and planning, the community can make current and future buildings and infrastructure more disaster-resistant by targeting flood-prone structures for buy-out and/or elevating functions out of the expected water level. Current projects of interest include:

    - Explore options to reduce/eliminate flooding risk at the Yuba Fire Department facility. This critical infrastructure is on the Pine River and is subject to flooding. It needs to be rebuilt unless the local mill goes out of business, at which time Yuba will unincorporated.
    - Look for options for one private rental property in Richland Center. Property has yet to receive funding. Carried forward and will continue to look for options.
    - Explore elevating 10-15 homes along Wisconsin Street in the VI of Viola. No funding available. Carried

[64] http://groundwaterwatch.usgs.gov/AWLSites.asp?S=431840090203201&ncd=

forward and will look to complete once funding becomes available.
  - Property owner in VI of Viola is interested in buyout. Did not receive CBA funds in 2011 or 2014. Two additional property owners are not currently interested.
  - The WEM hazmit section has identified an RLP in the TN of Eagle. Will continue to work with township to secure support and funding.

- Insert a ditch with control system to control flash flooding. Drainage district was created. Lone Rock ground water study done 2011-2012. Training completed in 2013.

- Pre-identifying infrastructure (roads, bridges, culverts, shoulders) prone to flooding and directing current and future budgetary dollars towards making the infrastructure disaster-resistant as it is scheduled for routine maintenance. Some roadways that have been identified as needing upgrades roadways to prevent future flooding damage include:

Richland County road with erosion due to overtopping of flood waters. 2009

  - Highway 80 – flooding caused the K-rails to float into the road requiring replacement. Road needs improved drainage. This is a main north/south trunk road that runs along with Hwy 14. Some drainage work has been completed on the eastern edge of Hwy 80, north of Hwy 193. Carried forward and will be completed as funding allows.
  - CTH JJ from STH 14 to the Sauk County line – improve drainage to keep water off of the road

- Redo 4 miles of County Hwy TB – change grade, elevation, paved shoulders where prone to flood damage, add culverts and upsize current culverts.
- County Highways A, H, OO, Q and Z – pave shoulders prone to flood damage, redo ditch to promote correct drainage and add culverts where appropriate.
- Town Road Twin Bluffs Rd. – elevate section of road, re-pave shoulders prone to flood damage, redo ditches to improve drainage.

Richland County home with sandbags. 2009

Fog

Fog, at its most basic definition, is a cloud based on the ground rather than in the atmosphere. [65]

Physical Characteristics

Fog occurs when the air near the ground is saturated with moisture and condenses on tiny particles suspended in the air. These particles are called cloud condensation nuclei and actually attract water vapor molecules to their surfaces. Once condensation occurs on these tiny surfaces, the resulting liquid drops can remain suspended in the air because their weight causes them to descend slowly to the ground or be carried around by wind. The dew-point temperature, or saturation vapor pressure, can be reached by either adding more water vapor to the air or cooling the air down to the dew-point temperature. Fog is classified by the dominant formation process and exists as long as processes continue to maintain saturated conditions. There are several basic types of fog:[66]

[65] http://www.fi.edu/weather/events/fog.html
[66] http://www.jsonline.com/weather/wtmj/fogtypes.stm, http://www.usatoday.com/weather/tg/wadvfog/wadvfog.htm, http://www.usatoday.com/weather/tg/wfallfog/wfallfog.htm, http://www.usatoday.com/weather/tg/wrainfog/wrainfog.htm, http://www.usatoday.com/weather/wfog.htm, http://www.cimms.ou.edu/~cortinas/1014/l12_3.html

- Radiation Fog is caused by cooling close to the earth's surface. The earth gives off long-wave radiation which on a clear night travels out into space. If the temperature drops to the dew point close to the ground, radiation fog can form. Radiation fog is also known as ground fog. The fog normally disappears soon after sunrise as the sun's warmth evaporates it.
    - Valley Fog is one type of Radiation Fog that forms in mountain valleys during winter and can be more than 1,500 feet thick. Often, the winter sun is not strong enough to evaporate the fog during the day. When the air cools again the following night, the fog often becomes thicker, which makes it even harder for the sun to burn it off the following day. These fogs can last for several days until strong winds blow the moist air out of the valley. The tendency for cool, dense air to pool at the bottom of valleys also enhances valley fog.
- Advection Fog results from the movement (advection) of warm, moist air from the south over a colder land mass. During the winter this is common when snow covers much of the Midwest. The snow cools the bottom portion of the moist airmass often resulting in condensation. The thickest advection fog usually forms during nights with light winds because humid air near the ground is not mixed with the drier air above. With light winds, the fog near the ground can become thick and reduce visibilities to zero; usually the fog burns off during the day but it can last many days if it is thick enough to block out the sun’s light. This type of fog can occur almost anywhere in the United States, especially during winter warm-ups and early spring thaws. It can be widespread and very dangerous to commuters and aircraft travel.
- Evaporation Fog around Wisconsin is caused by cold air crossing over warmer bodies of water. The water evaporates its moisture into the colder air which immediately condenses it into clouds and fog. This is what looks like steam over Lake Michigan, inland lakes and rivers on a cold autumn or winter day. This rising fog can be found above thermal pools in Yellowstone National Park and is what you see when cool rain hits hot pavement. This may also be called “steam fog” or “sea smoke” when it forms over oceans. Sometimes this fog is lifted quickly and forms rotating whirls of fog known as *steam devils*.

- Upslope Fog is common near the Rockies, including the Denver area. If the winds are out of the east, the air flows up as it rises in elevation approaching the mountains. This can cool the air to its dew point and result in widespread fog.
- Rain Fog is created when late afternoon or evening showers and thunderstorms during the spring and summer leave the ground soaked just as the sun sets. Though the rain usually stops overnight, the high humidity level created by the rainfall will not allow the moisture to evaporate and as a result, fog forms. This occurs especially at times when there are light winds. As the air warms up the next morning, this rain-enhanced fog will usually burn off by midday.
- Precipitation Fog forms when rain or snow falls. As precipitation falls into drier air below the cloud, the liquid drops or ice crystals evaporate or sublimate directly into water vapor. The water vapor increases the moisture content of the air while cooling the air. This often saturates the air below the cloud and allows fog to form.

Frequency of Occurrence

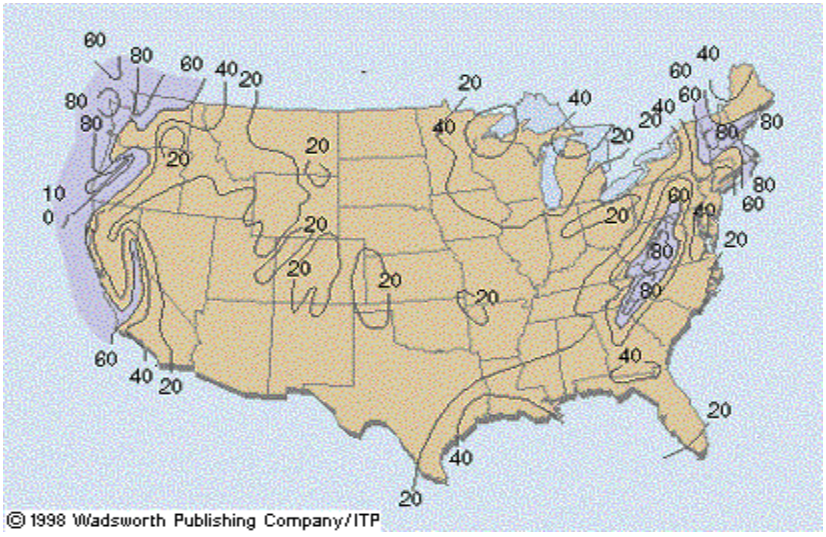
Some locations on this planet have weather conditions that are conducive to making fog frequently such as:

- San Francisco, California has an average of 18 days of heavy fog each year.
- Cape Disappointment, Washington is the foggiest place on the western U.S. coast with an average of 106 days of heavy fog per year.
- The foggiest area on the east coast of the United States is found along the rockbound coast of Maine. Moose Peak Lighthouse on Mistake Island, at an elevation of 72 feet, averages 1580 hours of heavy fog each year. Many other locations have problems with fog, such as Eastport, Maine with 65 days annually and Portland, with 55 days of heavy fog each year.
- Inland areas with regular heavy fog include parts of the Appalachian Mountains such as a peak area in West Virginia that averages over 100 days each year. Elkins, at

an elevation of 1948 feet has about 81 days annually with heavy fog.

- Milwaukee averages about 26 days with some heavy fog and this is comparable to the fog seen in Richland County.[67]

Average Annual Number of Days with Heavy Fog in the United States



The entirety of Richland County is geographically susceptible to fog, particularly valley fog, which is most common in the late summer and early fall months. On calm nights, colder air settles into valleys leading to colder low temperatures compared to ridge top locations. The National Weather Service reported one fog event in the county between 1 January 1950 and 31 January 2016 although it should be noted that the second deadliest crash (tied with Washington County on 12 February 1997) in the state attributed to fog occurred in Richland County on 27 July 1940; eight people were killed.

Year	Date	Location	Human Losses	Damage Losses
2010	12/29	Richland Co.	Death/Injury: 0	Property/Crop: $0

Considering its geographical location, Richland County has a high probability of fog occurrence in the future and the likelihood of damage (i.e., death and/or injury) due to fog is considered low.

[67] http://www.jsonline.com/weather/wtmj/fogplaces.stm

Vulnerability

Perhaps the largest vulnerability to fog is due to automobile traffic crashes. According to the Wisconsin Department of Transportation, dense fog contributes to hundreds of car accidents per year in the state. Following are the Wisconsin Department of Transportation's statistics for fog-related traffic crashes from 1999-2004:

Death and Injury Statistics for Fog-Related Traffic Crashes						
	1999	**2000**	**2001**	**2002**	**2003**	**2004**
Total Crashes	1259	1008	1066	595	772	1141
Fatal Crashes	14	12	19	12	11	16
People Killed	15	13	22	22	11	19
Injury Crashes	528	445	425	238	274	423
People Injured	777	643	593	372	391	615
Property Damage Crashes	717	551	622	345	487	702

Traffic Conditions at the Time of Fog-Related Traffic Crashes						
	1999	**2000**	**2001**	**2002**	**2003**	**2004**
Total Crashes	1259	1008	1066	595	772	1141
Daylight	467	340	295	158	257	398
Dark/Lighted	130	107	130	324	80	140
Dark/Unlit	547	439	491	46	343	456
Dusk	9	18	16	56	7	16
Dawn	99	101	126	9	77	122
Unknown Light Conditions	7	3	8	2	8	9

Some notable fog-related traffic crashes in the area of southeastern Wisconsin follow:

- On the morning of Friday, October 11, 2002, 50 vehicles were involved in a massive vehicle accident on Interstate 43 in Sheboygan County near Cedar Grove, Wisconsin just north of Waukesha County. This accident was the deadliest pile-up in Wisconsin history with ten individuals killed and over 40 people injured. Of the injured, seven were in critical condition and one was in serious condition at area hospitals immediately after the incident; 28 other people were treated and released for injuries ranging from burns to broken

bones. The accident occurred as cars heading south collided into one another as some vehicles slowed down in a dense fog. This led to a chain reaction as numerous cars were unaware of the scene hidden behind a veil of fog. Chad Kruse, a driver interviewed after the accident, described it by saying, “I entered the wall of fog, like someone took a blanket and threw it over the windshield.” At the same time but separate from this incident, four other accidents occurred nearby on the interstate; all the individuals involved with these accidents survived. [68]

The Fog, The Deadliest Traffic Crash in Wisconsin History; Trooper Tim Austin; Wisconsin Trooper, Callan Publishing Ins., Minneapolis, MN; Spring 2003.

[68] http://www.stoutonia.uwstout.edu/2002-2003/stories/021024/ne_04.html

- Fourteen people were injured in January 1996 in a 26-car pileup on southbound I-43 near Ozaukee County Highway KK. The first driver struck said he had missed his exit because of heavy fog and had slowed down to look for another when he was hit from behind.[69]
- In March 1990, three people were killed and 31 injured in a 52-vehicle pileup on the Tower Drive Bridge in Green Bay after dense fog and smoke from nearby paper mills created a "white wall" that reduced visibility to less than 10 feet. The accident was believed to be triggered when a tanker truck overturned and a ruptured gas tank ignited. Vehicles following too closely on the fog-shrouded bridge slammed into the tanker and were engulfed by a sheet of flames.[70]

As seen in the true examples above, fog-related incidents can cause death, injury and property loss to the vehicle owners and occupants and their insurance companies. Responding governmental agencies also may suffer losses due to the cost of response, for damage done to roadways and structures due to fires and for potential injuries to responders working in a reduced-visibility zone. Citizens may be impacted by the closure of roadways and delay of activities; businesses may suffer losses due to the absence of workers due to delay, injury, and/or death and because of the delay of product on the roadways and direct loss of product in the crash (e.g., due to fire).

Hazard Mitigation Strategies

The goal of fog mitigation activities is to reduce the loss of lives and property due to these incidents. There are few cases where infrastructure would be impacted by fog so there is little that the community can do to plan future buildings and infrastructure in a way that will mitigate these problems. Most mitigation measures will involve public information about the largest dangers: automobile and boating crashes.

The Richland County Sheriff's Office will also release public service announcements (PSAs) on the local radio station (WRCO 100.9 FM and 1450 AM) when conditions warrant.

[69] The Fog, The Deadliest Traffic Crash in Wisconsin History; Trooper Tim Austin; Wisconsin Trooper, Callan Publishing Ins., Minneapolis, MN; Spring 2003.
[70] http://www.jsonline.com/news/state/oct02/87083.asp

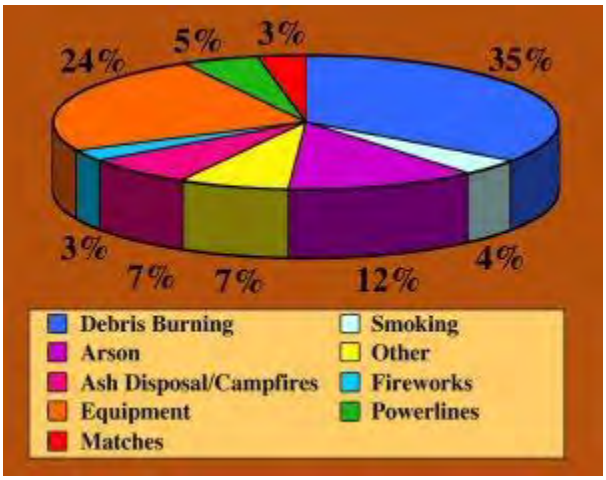
Wildfires

The wildfire season in Richland County begins in March and continues through November, although fires can occur at any time during any month of the year. Generally speaking, however, fires are more likely to occur whenever vegetation is dry as a result of a winter with little snow or a summer with sparse rainfall.

The Wisconsin Department of Natural Resources (DNR) is responsible for forest fire protection on approximately 18 million acres of forest and wild land in Wisconsin. The U.S. Forest Service maintains forest fire protection on two million acres of this land while local fire departments retain responsibility for the remaining wooded acreage.

Physical Characteristics

According to the DNR, there are approximately 1,500 fires annually that burn over 5,000 acres of the land that they protect; over 90% of these fires are human-caused. It should be noted that these figures do not include areas of the state where a local fire department has primary responsibility for service.[71]



The Bear Creek Fishery Area, Knapp Creek Unit – Lower Wisconsin – State Riverway, Willow Creek Fishery Area, Pine River Public Hunting Grounds, Hub City Bog, Richwood Bottoms, Orion Mussel Beds, Bear Creek Sedge Meadows, Gotham Jack Pine

[71] http://dnr.wi.gov/org/land/forestry/fire/fire-ps.htm

Barrens and Smith Slough and the Sand Prairie are the natural areas in Richland County. The DNR is responsible for forest fires on state lands and they are supported by and work closely with local fire departments on other forest and wildfires.

Frequency of Occurrence

While the total number of open fires in Wisconsin has decreased over the years, the potential danger to lives and property remains due to the increased encroachment of development into previously open lands. Overall, the probability for a forest fire in Richland County is moderate (and would only occur in those pockets of wooded area within the county) and the probability of a wildfire (e.g., grass fire) is high. The probability of damage from forest fire is high and from wildfire is considered moderate. There has been one statewide wildfire event recorded since 1950 by the National Weather Service. This event occurred on 23 April 1994 and caused no injuries or deaths but did cause $500,000 in crop and property damage (each).

Vulnerability

Wildfires can impact the ecology of the open lands. Richland County, which has multiple forests, would be impacted by a wildfire since a disruption from fire could erase the usability of this habitat for wildlife and/or recreational purposes for many years.

In 2003, the National Association of State Foresters produced a Field Guidance for Identifying and Prioritizing Communities-at-Risk (CAR). The purpose of the guide was to provide states with a nationally consistent approach for assessing and displaying the risks to communities from wildfire. The DNR, in cooperation with its federal and tribal partners, began working on the statewide assessment of Communities-at-Risk in 2004.

Communities-at-Risk is a model to identify broad areas of the state that are at relatively high exposure to resource damage due to wildfire. Results of the model can then be used by local governments developing Community Wildfire Protection Plans (CWPP) and by the DNR to reduce local risks of wildland fire by prioritizing hazard mitigation and fire protection efforts.

The approach used in this risk assessment model is based on the "Methodology" section of the NASF Field Guidance document which recommends assessing and mapping four factors:

- Historic Fire Occurrence
- Hazard
- Values Protected
- Capabilities

Modifications to this methodology were made to fit the GIS mapping data layers available for Wisconsin. The Wisconsin DNR uses three factors to assess Communities-at-Risk to wildfire damage:

- Hazard – the relative likelihood that an ignited wildfire will achieve sufficient intensity to threaten life or property based on land cover type and historic fire regime.
- WUI (Values at Risk) – the relative vulnerability of each 2000 census block to wildfire damage based on housing density and spatial relationship with undeveloped vegetation based on housing density and proximity to vegetation (Wisconsin's Wildland-Urban Interface). Wisconsin's WUI was layered with a weighted vegetation layer to accentuate proximity to flammable vegetation.
- Ignition Risk – the relative likelihood of a wildfire ignition within a given 30-m pixel based on historic fire occurrence, population density and proximity to a potential ignition source.

Models were developed in GIS to create statewide grids representing each of the three weighted inputs {Hazard (40%), WUI (30%), and Risk (30%)}. This composite grid represents communities-at-risk (CAR) on a 0-9 scale of threat, with zero representing no threat and nine a very high threat. The data was then represented by municipal civil divisions (MCDs), which are city and village boundaries. Quantitative markers were assigned for five threat levels: very low, low, moderate, high, and very high and those MCDs determined to have a high or very high threat of wildfire were considered CARs. 337 communities met the requirements for being "at risk."

Communities in Wisconsin vary considerably in size. This is particularly evident in a north-south pattern, with smaller, more rural towns in northern Wisconsin and larger, more urban towns in southern Wisconsin. Because of this variation in size, the potential for missing areas of high risk due to smoothing out by other parts of the town was greater for larger towns. For this reason, WI DNR incorporated a "Community of Concern" category to identify those towns that have portions of their town in high risk of wildfire but were not otherwise included as a Community-at-Risk. A Community-of-Concern was determined to be an area of at least two contiguous square miles at high or very high risk; 237 Wisconsin communities were named as Communities-of-Concern.[72]

As can be seen on the map in Appendix A the following Richland County municipalities were identified as Communities of Concern (note that there were no Communities at Risk):

Communities of Concern:

- Town of Buena Vista
- Town of Forest
- Town of Orion

Hazard Mitigation Strategies

Government at all levels is developing mitigation programs in fire control and firefighting tactics with the goal of protecting lives and property from loss due to forest and wildfire. Local fire departments attend regular trainings on fire-fighting tactics to keep their skills honed. The County Emergency Management Department assists local departments and their staff with available grant applications

[72] Wisconsin State Hazard Mitigation Plan

for training, exercising, equipment and planning as able and requested.

The emergency management office also partners with the local fire departments to provide information to homeowners about fire safety and other mitigation strategies (e.g., protecting structures from wildfires), especially during Fire Safety Week in October of each year.

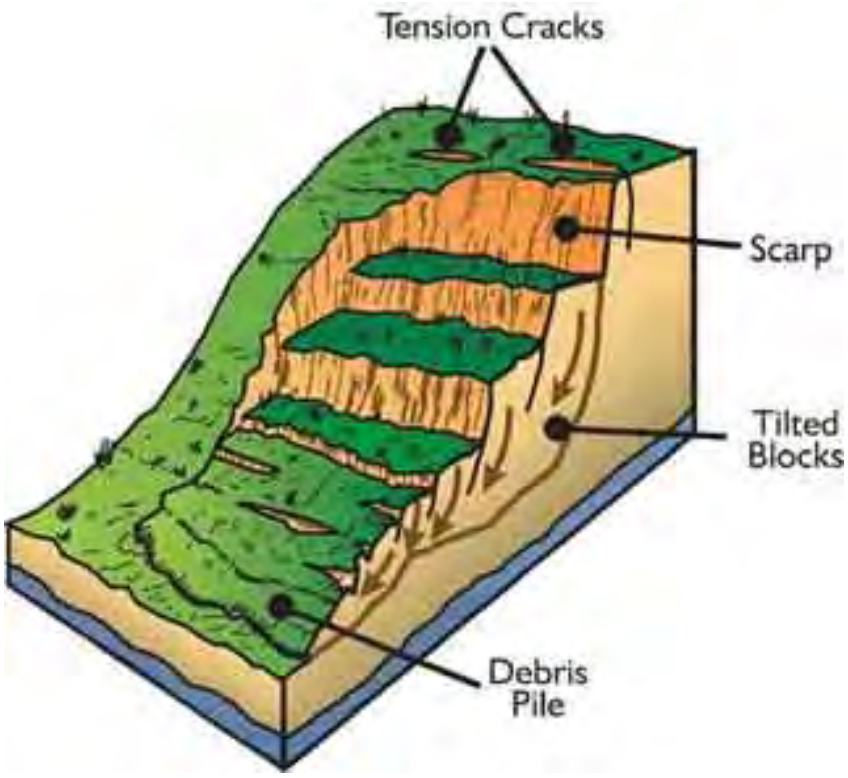
The Wisconsin Department of Natural Resources (DNR) has a satellite forestry office in the City of Richland Center and the main office, where the majority of the rangers work and heavy equipment and supplies are stored, is in Spring Green (approximately 24 miles/35 minutes away in Iowa County). The DNR offers annual training to local fire departments and they conduct a controlled burn exercise activity rotated around the area each March.

The hazard mitigation strategies listed above are designed to reduce damages to existing or future buildings and infrastructure by providing information on general fire safety measures to the public for residential and commercial structures and providing ongoing training to the firefighters who fight these types of fires.

Landslide

The term landslide includes a wide range of ground movement such as rock falls, deep failure of slopes and shallow debris flows. Although gravity acting on an over-steepened slope is the primary reason for a landslide, there may be other contributing factors. Factors likely to be seen in Richland County include:

- Erosion by rivers or lakes creating over-steepened slopes.
- Rock and soil slopes being weakened through saturation by snowmelt or heavy rains.
- Excess weight from the accumulation of rain or snow, stockpiles of rock or ore, waste piles, or from man-made structures stressing weak slopes to failure.[73]



This illustration shows the parts of a general landslide.

[73] http://landslides.usgs.gov/html_files/nlic/page5.html

This picture shows landslide damage to a roadbed similar to that found in flash flood events in Richland County. [74]

Physical Characteristics

Landslides may include any combination of natural rock, soil or artificial fill and are classified by the type of movement and the type of material. The types of movement are slides, flows, lateral spreads and falls and topples; a combination of two or more landslide movements is a complex movement:

Slides: straight or rotating downward displacements along one or more failure surfaces of soil or rock as a single intact mass or a number of pieces

Flows: a rapid, downhill mass movement of a “slurry” comprised of loose soil, rocks, organic matter, air and water

Lateral spreads: large movements of rock, fine-grained soils or granular soils distributed laterally

[74] http://www.geology.enr.state.nc.us/Landslide%20web%20version/Geologic_hazards_landslides/Landslides_main.htm

Falls and Topples: masses of rocks or material that rapidly detach from a steep slope or cliff that free-fall, roll or bounce.

Almost any steep or rugged terrain is susceptible to landslides under the right conditions. The most hazardous areas are steep slopes on ridges, hills and mountains; incised stream channels and slopes excavated for buildings and roads. Slide potentials are enhanced where slopes are destabilized by construction, heavy rainfall, floods or river erosion. Debris flows generally occur during intense rainfall on water saturated soil. Surface runoff channels along roadways and below culverts are common sites of debris flows.

Landslides often occur together with other major natural disasters thereby exacerbating relief and reconstruction efforts:

Floods and landslides are closely related and both involve precipitation, runoff and ground saturation that may be the result of severe thunderstorms.

Landslides into a reservoir may indirectly compromise dam safety or a landslide may even affect the dam itself.

Wildfires may remove vegetation from hillsides, significantly increasing runoff and landslide potential.

Landslide from fire damage in CO[75]

Sinkholes can form naturally in areas with karst geology (i.e., areas with limestone or other bedrock that can be dissolved by water). As the limestone rock under the soil dissolves over time from rainfall or

[75] http://landslides.usgs.gov/html_files/landslides/slides/slide15.htm

flowing groundwater, a hollow area may form underground into which surface soil can sink. Sinkholes also can be caused by human activity such as collapsed, abandoned underground mines. Even though sinkholes have not been a factor in any natural disaster, identifying areas with karst conditions is important for not only public safety and protection of structures but because karst features provide direct conduits to groundwater. Areas with karst conditions are vulnerable to groundwater contaminants from pollutants entering a sinkhole, fissure or other karst feature.

Enlarged fracture in Brown County, WI[76]

Frequency of Occurrence

According to the U.S. Geological Survey, landslides are a widespread geologic hazard, occurring in all 50 states where they cause on average $1 to $2 billion in damages and more than 25 fatalities annually. Landslides pose serious threats to highways; railroads and structures that support fisheries, tourism, timber harvesting, mining, and energy production. Expanding urban development and other land uses have increased the incidence of landslide disasters in the United States.

Very heavy rains in late June, 2013 cause flooding and landslides in much of southwestern Wisconsin. In the City of Boscobel (Grant County), which is about 5 miles from the Richland County line, a mudslide estimated to be 25 feet high and 200 yards long occurred

[76] http://www.uwex.edu/wgnhs/enlargedjoint.htm

on June 24th along Highway 61 between Highway 60 and the bridge to Boscobel. No one was injured but the roads were closed for clearing and repair for several days.[77]

Highway 61 landslide clearing near Boscobel, WI.

According to the NOAA/National Weather Service – La Crosse Natural Hazards Assessment of Richland County, seven to thirteen inches of rain fell during the evening of August 18, 2007 leading to widespread flash flooding with one death and property and crop damage in excess of $9 Million. During this storm, reports of landslide were common.[78]

There have been no recent reports of major landslide in Richland County although local officials reported that due to cutting roadways into the hills, storm water does rush down the bluff causing debris to wash onto the roadways leading this to likely be a localized phenomenon within the county. Wisconsin Emergency Management has determined that Richland County has a low likelihood of occurrence. (See the map in Appendix A) although county officials believe that their susceptibility is moderate and that the severity of effects should it happen is low.

The karst potential map in Appendix A shows that Richland County has a shallow karst features throughout the entire county. The presence of this geologic feature supports the high probability of complications (e.g., sinkholes, fissures to groundwater) to residents although county officials believe that is it low. The good news is that

[77] http://www.nbc15.com/home/headlines/New-landslide-closes-Highway-61-in-Crawford-Co-212815651.html
[78] http://www.crh.noaa.gov/images/arx/nathaz/RIChazards.pdf

the complications due to karst geology have a low probability of causing significant damage, injury or death.

Sinkhole in Monroe County, WI[79]

Vulnerability

The most likely consequences of landslides in Richland County would be damage to structures built on or near eroding bluffs. The most common hazard in these events is when rocks and other debris wash down the bluffs and onto roads, posing a hazard for motorists. This danger would be exacerbated in a flash flood where the remains of the normally-stable base were quickly and forcefully eroded by fast-moving water as was seen in the August 18, 2007 flash flooding incident.

Cincinnati, Ohio[80]

[79] http://www.uwex.edu/wgnhs/cavesink.htm
[80] http://landslides.usgs.gov/html_files/landslides/slides/slide8.htm

Karst geology, which has been identified in Richland County, can lead to sinkholes under structures such as homes, businesses, roadways and railroads causing economic losses and possible injury to residents and the community.

Hazard Mitigation Strategies

The goal of landslide mitigation activities is to reduce, in a cost effective manner, the loss of lives and property due to these events. Although the physical cause of many landslides cannot be removed, geologic investigations, good engineering practices and effective enforcement of land-use management regulations can reduce landslide hazards. Karst features should be considered in land use planning, stormwater management and hazardous materials planning to avoid possible damage to structures due to sinkholes or contamination of groundwater. Richland County will continue to work with its municipal partners to ensure that areas at risk of landslide and karst-related complications are identified and appropriate mitigation strategies such as improved/increased signage, retaining walls and increased lighting in areas of concern are employed as appropriate.

Coordination and cooperation among the private sector and various state, county and municipal planning and zoning departments will reduce effects on existing and future buildings and infrastructure by ensuring that safety is regulated and engineered into them.

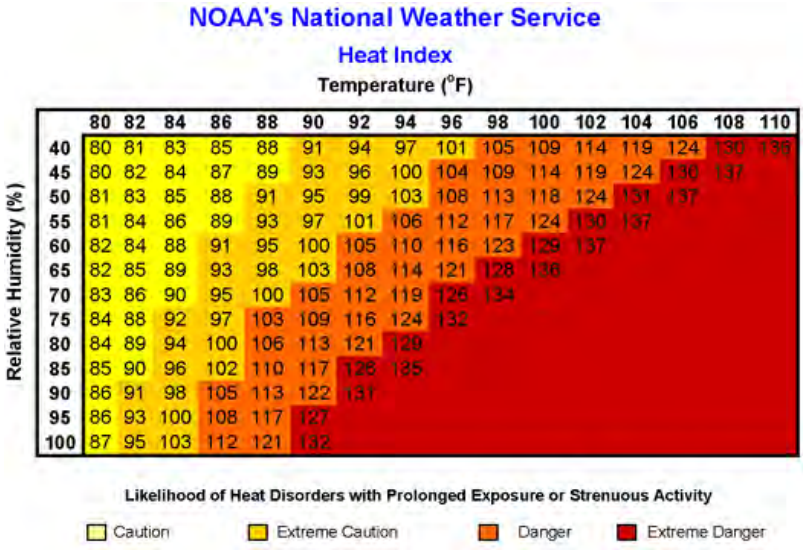
Severe Temperatures

Characteristics

Temperature extremes can cause disruption of normal activities for the population, property loss and even the loss of life, especially among the more vulnerable members of our population such as the chronically ill, children and the elderly.

Physical Characteristics: Heat

Heat emergencies are a result of the combination of very high temperatures and very humid conditions.



The Heat Index estimates the relationship between these two conditions and reports them as a danger category, as can be seen in the following table.[81]

[81] FEMA, 1997; NWS, 1997

Heat Index and Disorders Table			
Danger Category		**Heat Disorders**	**Apparent Temperatures [°F]**
IV	Extreme Danger	Heatstroke or sunstroke imminent.	>130
III	Danger	Sunstroke, heat cramps, or heat exhaustion likely; heat stroke possible with prolonged exposure and physical activity.	105-130
II	Extreme Caution	Sunstroke, heat cramps, and heat exhaustion possible with prolonged exposure and physical activity.	90-105
I	Caution	Fatigue possible with prolonged exposure and physical activity.	89-90

The major risks to people due to extreme heat are:

- Heatstroke – a potentially lethal medical emergency where the ability of a person to thermo-regulate is compromised resulting in the rise of the body's core temperature to above 105°F (Fahrenheit).

- Heat Exhaustion – a less threatening medical condition where the victim complains of dizziness, weakness and/or fatigue. The victim may have a normal or slightly elevated temperature and usually can be successfully treated with fluids.

- Heat Syncope – a sudden "faint" or loss of consciousness usually brought on by exercising in warmer weather than one is accustomed to, usually no lasting effect.

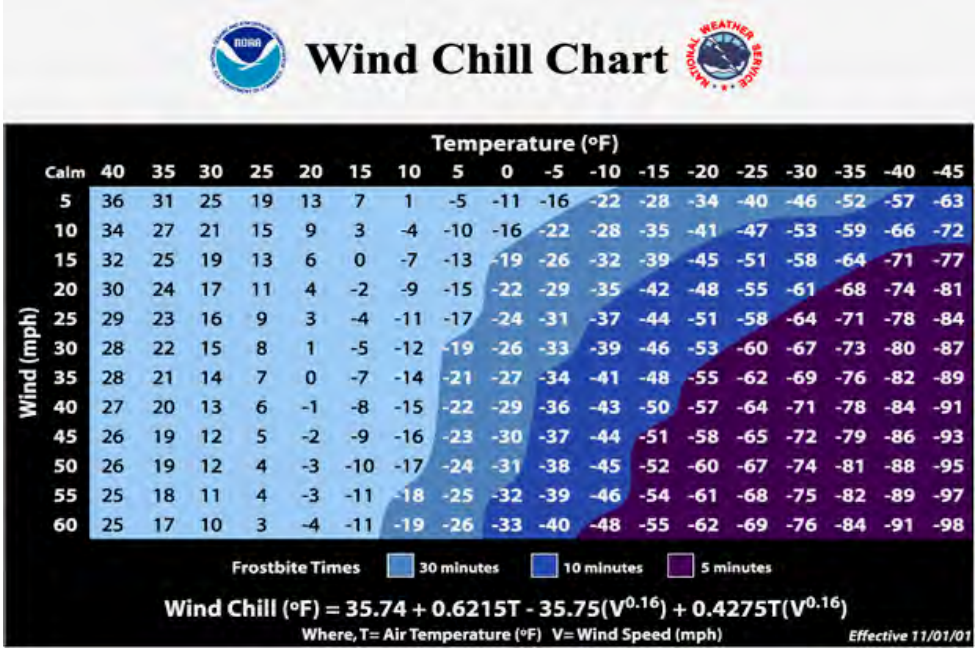
- Heat Cramps – muscular cramping brought on by exercising in warmer weather than one is accustomed to, no lasting effect.

Extreme heat conditions may also affect pets and livestock, decreasing agricultural output by the latter. Crops may suffer reduced yield due to extremely hot conditions.

Physical Characteristics: Cold

Wind chill is a relationship between wind and cold that is based on the rate of heat loss from exposed skin. As the wind speed increases, heat is drawn from the body, driving down skin

temperature and eventually core body temperature. The following table illustrates this relationship.[82]



Wind Chill Chart

Wind (mph) \ Temperature (°F)	Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5		36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10		34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15		32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20		30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25		29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30		28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35		28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40		27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45		26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50		26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55		25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60		25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times: 30 minutes; 10 minutes; 5 minutes

$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T= Air Temperature (°F) V= Wind Speed (mph)

Effective 11/01/01

The National Weather Service issues Wind Chill Advisories when wind chill readings of -20° F to -34° F are expected. Wind Chill Warnings are issued when wind chill values at or below -35° F are expected or occurring.

The major risks to people due to extreme cold are:

- Hypothermia – occurs when, due to exposure to cold, the body is unable to maintain its proper core temperature. It may occur in temperatures above freezing and may lead to death.

- Frostbite – describes local cooling, usually to an extremity, which occurs when exposure to cold air or liquid causes constriction of the blood vessels. There are three degrees of frostbite:

    - Frostnip – brought on by direct contact with a cold object or exposure to cold air or water. Tissue damage is minor and response to treatment is usually very good.

[82] National Weather Service: http://www.nws.noaa.gov/om/windchill/index.shtml

  - Superficial Frostbite – involves the skin and subcutaneous layers.
  - Freezing – is deep frostbite in which the skin, subcutaneous layers and deeper structures (e.g., muscles, bone, deep blood vessels, organ membranes) of the body are affected and can become frozen.

- Chilblains - lesions that occur from repeated/chronic exposure of bare skin to temperatures of 60°F or lower.
- Trench foot – a condition that occurs when the lower extremities remain in cool water for a prolonged period of time.

Frequency of Occurrence

Richland County, like all of Wisconsin, experiences great swings in seasonal temperature extremes. According to the National Weather Service (NWS), the upper Midwest is subject to arctic cold outbreaks that lead to sub-zero temperatures which occur 21 times per winter on average, usually in January or February. Average lows in these months are in the single digits and record lows are colder than -20° F most days. In 1996, the Richland Center area went nine consecutive days with low temperatures at or below -12° F, with six consecutive days of low temperatures ranging from -32° F to -38° F during that period. On January 30, 2008 a wind chill of -38° F was recorded in Richland Center.

The upper Midwest also gets occasional weather patterns that favor prolonged heat and humidity, leading to heat waves. June through August are usually the warmest months with average high temperatures in the 80s and record highs above 100° F most days.

Following is a table that shows the top five most extreme cold and hot temperatures as recorded in Richland Center by the NWS as of October, 2013.

TEMPERATURE EXTREMES AT RICHLAND CENTER, WI			
COLDEST LOWS		WARMEST HIGHS	
Low	Date	High	Date
-46° F	1/30/1951	110° F	7/14/1936
-40° F	2/2/1951	109° F	7/13/1936
-40° F	2/20/1929	108° F	7/12/1936
-39° F	1/15/1963	105° F	7/11/1936
-38° F	2/4/1996	104° F	7/29/1941

Heat

Wisconsin has been affected by several bouts of extreme heat including during the Dust Bowl period from 1934-1936. Other heat events occurred in 1979, 1995, 2001, 2011, and 2012.

Excessive heat events recorded by the National Weather Service in Richland County between 1 January 1950 and 31 January 2016:[83]

Year	Date	Location	Human Losses	Damage Losses
2011	07/17	Richland Co.	Death/Injury: 0	Property/Crop: $0

Heat events recorded by the National Weather Service in Richland County between 1 January 1950 and 31 January 2016:[84]

Year	Date	Location	Human Losses	Damage Losses
1999	07/04	Richland Co.	Death/Injury: 0	Property/Crop: $0
	07/23	Richland Co.	Death/Injury: 0	Property/Crop: $0
	07/29	Richland Co.	Death/Injury: 0	Property/Crop: $0
2001	07/31	Richland Co.	Death/Injury: 0	Property/Crop: $0
	08/01	Richland Co.	Death/Injury: 0	Property/Crop: $0
2012	07/02	Richland Co.	Death/Injury: 0	Property/Crop: $0

According to the State of Wisconsin Hazard Mitigation Plan, extreme heat is the number-one weather killer in Wisconsin with most of the heat deaths attributed to major heat waves. As can be seen by the historical tables, Richland County, like the rest of the state, is likely to experience extreme heat events every two to three

[83] http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=55%2CWISCONSIN
[84] http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=55%2CWISCONSIN

years with extended, major heat waves occurring about every two decades.

Following is a table listing the record high temperatures on record in Richland Center, WI through October, 2013:[85]

Warmest Highs at Richland Center, WI	
High	**Date**
110°F	7/14/1936
109°F	7/13/1936
108°F	7/12/1936
105°F	7/11/1936
104°F	7/29/1941

The workgroup therefore felt that there was a high likelihood of occurrence in any given year. The committee also felt that the loss of property, primarily crop and livestock output has a medium likelihood of occurring in a drought year. The loss of life or injury to people has a medium likelihood of occurrence for the general population but the committee recognized that the likelihood increases for certain populations such as the elderly, chronically ill, children, those who work outdoors and those with limited financial resources (i.e., to pay for air conditioning).

Cold

Wisconsin regularly has extreme cold temperatures as part of its winter climate. Following is a chart that lists the six extreme cold/wind chill events which have been recorded by the National Weather Service in Richland County between 1 January 1950 and 31 January 2016:[86]

Year	Date	Location	Human Losses	Damage Losses
2007	02/02	Richland Co.	Death/Injury: 0	Property/Crop: $0
2008	01/30	Richland Co.	Death/Injury: 0	Property/Crop: $0
	02/10	Richland Co.	Death/Injury: 0	Property/Crop: $0
2009	01/14	Richland Co.	Death/Injury: 0	Property/Crop: $0

[85] https://www.weather.gov/media/arx/nathaz/RIChazards.pdf
[86] http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=55%2CWISCONSIN

2014	01/06	Richland Co.	Death/Injury: 0	Property/Crop: $0
	01/27	Richland Co.	Death/Injury: 0	Property/Crop: $0

Wisconsin regularly has cold temperatures as part of its winter climate. Following is a chart that outlines cold/wind chill events which have been recorded by the National Weather Service in Richland County between 1 January 1950 and 31 January 2016:[87]

Year	Date	Location	Human Losses	Damage Losses
1997	01/16	Richland Co.	Death/Injury: 0	Property/Crop: $0
2008	12/14	Richland Co.	Death/Injury: 0	Property/Crop: $0
	12/21	Richland Co.	Death/Injury: 0	Property/Crop: $0
2009	12/10	Richland Co.	Death/Injury: 0	Property/Crop: $0
2010	01/01	Richland Co.	Death/Injury: 0	Property/Crop: $0
	01/28	Richland Co.	Death/Injury: 0	Property/Crop: $0

As can be seen in the above charts, there are few years where a cold event does not occur in Richland County. Following is a table listing the five coldest low temperatures recorded in Richland Center, WI as of October, 2013:[88]

Coldest Lows at Richland Center, WI	
High	**Date**
-46°F	1/30/1951
-40°F	2/2/1951
-40°F	2/20/1929
-39°F	1/15/1963
-38°F	2/4/1996

[87] http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=55%2CWISCONSIN
[88] https://www.weather.gov/media/arx/nathaz/RIChazards.pdf

After examining this data, the workgroup believed that cold and/or extreme cold has a high likelihood of occurrence in any given year. Since there are no crops out during the winter and most properties (homes, businesses, barns) are insulated for this climate, the loss of property due to temperature extremes is moderate although individuals may suffer damage due to water main breaks and other such problems. They further believed that the loss of life or injury to people has a medium likelihood of occurrence among the general population when there are cold/extreme cold weather events. Again, the workgroup recognized that people who work outdoors, who have limited financial resources, the elderly, the young and the chronically ill have a higher risk profile.

Vulnerability

Vulnerability to temperature extremes is generally assessed on an individual basis with the most vulnerable sections of our community's population having the greatest risk. These people may include the elderly, the very young, and the chronically ill. People from economically disadvantaged backgrounds, especially those listed in the categories above, are even more vulnerable since they are least able to afford the cost of adequate heating or air conditioning systems.

The Richland County social services agencies are aware of many of these people who reside in our communities and they, along with the public health department, have plans and access to economic assistance programs to help these people in times of concern.

Hazard Mitigation Strategies

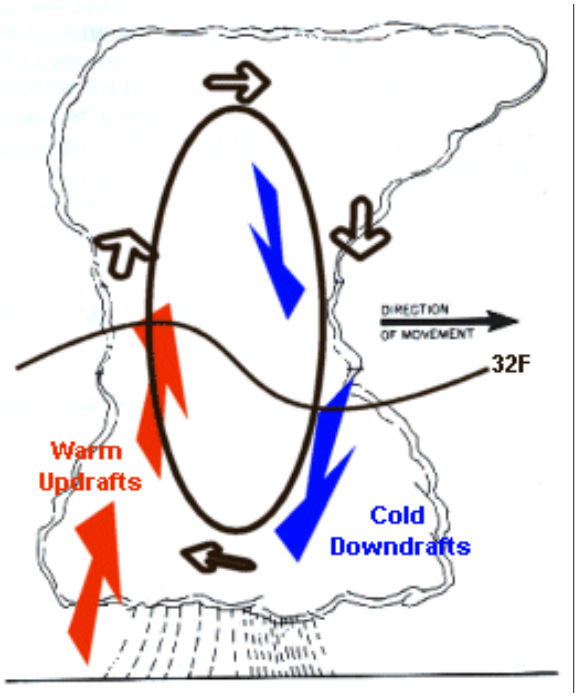
The goal of severe temperature mitigation activities is to reduce, in a cost effective manner, the loss of lives and property due to these events. Temperature extremes are difficult for a community to mitigate and the risks are to the health and safety of citizens, animals, and crops. There are no strategies that need to be employed to reduce damages to buildings and infrastructure.

The Richland County Emergency Management Office participates in the statewide public information campaigns for Winter and Heat Awareness Weeks each year and will provide more links to personal preparedness information on its website. Emergency

Management and the Public Health Department also provide public service announcements (PSAs) on the local radio station (WRCO 100.9 FM and 1450 AM) when needed.

Storms: Hail

Studies of thunderstorms indicate that two conditions are required for hail to develop: sufficiently strong and persistent up-draft velocities and an accumulation of liquid water in a super-cooled state in the upper parts of the storm. Hailstones are formed as water vapor in the warm surface layer rises quickly into the cold upper atmosphere. The water vapor is frozen and begins to fall; as the water falls, it accumulates more water vapor. This cycle continues until there is too much weight for the updraft to support and the frozen water falls too quickly to the ground to melt along the way. The graphic below depicts hail formation:[89]



Injury and loss of life are rarely associated with hailstorms, however extensive property damage is possible, especially to crops.

[89] Source: NWS, January 10, 2003

Physical Characteristics

Hail may be spherical, conical or irregular in shape and can range in size from barely visible in size to grapefruit-sized dimensions. Hailstones equal to or larger than a penny are considered severe.

Hail Size Estimates[90]	
Size	**Inches in Diameter**
Pea	1/4 inch
Marble/mothball	1/2 inch
Dime/Penny	3/4 inch
Nickel	7/8 inch
Quarter	1 inch
Ping-Pong Ball	1 1/2 inch
Golf Ball	1 3/4 inches
Tennis Ball	2 1/2 inches
Baseball	2 3/4 inches
Tea cup	3 inches
Grapefruit	4 inches
Softball	4 1/2 inches

Hail falls in swaths that can be from twenty to one hundred miles long and from five to thirty miles wide. A hail swath is not a large continuous path of hail but generally consists of a series of hail cells that are produced by individual thunderstorm clouds traveling in the same area.

Frequency of Occurrence

Hailstorms usually occur from May through August, with June being the peak month, and Wisconsin averages two or three hail days per year. The most common time for hail is between 1:00 – 9:00 p.m. but it can occur at any time of the day and at any location within the county. Based on historical patterns, Richland County has a high probability of hail occurrence and the likelihood of damage due to hail is considered medium.

Most hail damage occurs in rural areas because maturing crops are particularly susceptible to bruising and other damage caused by hailstones. The four months of hailstorm activity correspond to the

[90] NWS, January 10, 2003

growing and harvesting seasons for most crops. According to the NWS, on May 12, 2000 hail the size of baseballs fell in the Hub City and Viola areas. Large hail also hit Richland Center in 1974 and there have been 44 large hail (> ¾") events in the county since 1982. Following is a table that shows the hail events recorded by the National Weather Service between 1 January 1950 and 31 January 2016.[91]

Date	Location	Death	Injury	Property Damage	Crop Damage	Misc.
5/9/1963	Richland County	0	0	0	0	0.75 in.
5/13/1974	Richland County	0	0	0	0	0.75 in.
6/14/1974	Richland County	0	0	0	0	2.75 in.
6/14/1974	Richland County	0	0	0	0	1.75 in.
5/16/1977	Richland County	0	0	0	0	1.00 in.
9/1/1984	Richland County	0	0	0	0	0.75 in.
9/1/1984	Richland County	0	0	0	0	0.75 in.
9/1/1984	Richland County	0	0	0	0	1.75 in.
5/14/1985	Richland County	0	0	0	0	0.75 in.
7/9/1985	Richland County	0	0	0	0	1.50 in.
4/24/1989	Richland County	0	0	0	0	1.00 in.
5/30/1989	Richland County	0	0	0	0	1.00 in.
9/9/1994	Cazenovia	0	0	0	0	1.00 in.
9/9/1994	Sextonville	0	0	0	0	0.75 in.
5/16/1995	Yuba	0	0	0	0	1.75 in.
7/31/1995	Richland Center	0	0	0	0	0.00 in.
9/30/1995	Lone Rock	0	0	0	0	0.75 in.
5/12/1998	Gotham	0	0	0	0	0.75 in.
6/20/1998	Port Andrew	0	0	0	25K	0.75 in.
6/20/1998	Cazenovia	0	0	0	0	0.75 in.
5/12/2000	Viola	0	0	0	20K	1.75 in.
5/12/2000	Hub City	0	0	15K	35K	2.50 in.
5/31/2000	Cazenovia	0	0	0	0	0.75 in.
9/11/2000	Richland Center	0	0	0	3K	0.75 in.
4/11/2001	Richland Center	0	0	0	0	0.75 in.
6/11/2001	Richland Center	0	0	0	0	0.75 in.
6/18/2001	Viola	0	0	0	3K	1.00 in.
4/18/2002	Ithaca	0	0	0	0	0.75 in.
4/18/2002	Bosstown	0	0	0	0	1.00 in.
4/18/2002	Viola	0	0	0	0	1.00 in.
5/8/2002	Richland Center	0	0	0	0	0.75 in.
5/30/2002	Richland Center	0	0	0	0	0.75 in.
8/17/2002	Bosstown	0	0	0	0	0.75 in.
5/10/2003	Richland Center	0	0	0	0	1.00 in.
6/25/2003	Gillingham	0	0	0	0	0.75 in.

[91] http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=55%2CWISCONSIN

Date	Location	Death	Injury	Property Damage	Crop Damage	Misc.
6/28/2003	Boaz	0	0	0	1K	1.00 in.
7/31/2003	Travera	0	0	0	0	0.75 in.
4/17/2004	Boaz	0	0	0	0	0.75 in.
6/23/2004	Bosstown	0	0	0	5K	0.88 in.
8/26/2004	Gillingham	0	0	0	0	0.75 in.
5/24/2006	Richland Center	0	0	1K	0	1.00 in.
6/6/2006	Bloom City	0	0	0	0	0.75 in.
6/6/2006	Neptune	0	0	1K	0	0.88 in.
7/9/2006	Ashridge	0	0	0	0	0.75 in.
8/23/2006	Cazenovia	0	0	20K	50K	1.75 in.
8/24/2006	Sextonville	0	0	0	2K	0.88 in.
8/24/2006	Port Andrew	0	0	0	0	0.75 in.
8/25/2006	Bunker Hill	0	0	0	0	0.75 in.
8/25/2006	Cazenovia	0	0	0	3K	0.88 in.
10/4/2006	Richland Center	0	0	15K	30K	1.75 in.
10/4/2006	Richland Center	0	0	0K	0K	0.75 in.
3/21/2007	Gillingham	0	0	0K	0K	1.00 in.
6/28/2008	Basswood	0	0	0K	0K	0.75 in.
6/28/2008	Twin Bluffs	0	0	0K	0K	1.00 in.
6/28/2008	Twin Bluffs	0	0	0K	0K	0.75 in.
7/27/2009	Five Points	0	0	1K	20K	1.00 in.
7/27/2009	Five Points	0	0	0K	0K	0.88 in.
5/22/2011	Boaz	0	0	0K	0K	1.75 in.
6/8/2011	Richland Center	0	0	0K	0K	1.00 in.
9/4/2012	Richland Center	0	0	0K	0K	1.50 in.
4/29/2013	Gillingham	0	0	0K	0K	0.75 in.
8/1/2013	Excelsior	0	0	0K	0K	1.00 in.
8/1/2013	Excelsior	0	0	0K	0K	1.00 in.
5/7/2014	Sylvan	0	0	0K	0K	1.25 in.
5/7/2014	Sylvan	0	0	0K	0K	2.00 in.
5/7/2014	Cazenovia	0	0	0K	0K	1.25 in.
5/7/2014	Cazenovia	0	0	0K	0K	1.00 in.
5/7/2014	Cazenovia	0	0	0K	0K	0.75 in.
7/13/2015	Lone Rock	0	0	0K	0K	0.75 in.

It should be noted that this table represents only the hail incidents reported to the National Weather Service.

Vulnerability

Hail, typically occurring in conjunction with thunderstorms and lightning, can damage many types of infrastructure. Public and private vehicles (e.g., campers, boats, cars, trucks) are liable to have their windshields cracked, bodies dented and paint damaged

as a result of hail that usually larger than 1”. This damage can occur, depending on the size of the hail, whether the vehicle is moving through the storm or is stationary. Hail on the roadway can also cause vehicles to slide off the road. Vehicle damage and iced roadways are of particular concern when you consider the need for emergency vehicles such as police cars, fire trucks and ambulances to quickly move to assist victims in a disaster.

Hail can also damage critical infrastructure such as street signs, electric lines/poles/transformers, telephone lines and radio communication equipment. These pieces of infrastructure are needed by both first response agencies and the general community to ensure safe transport; warm, safe homes and good internal and external communications abilities.

Residential and business properties are liable to receive damage to signs, siding, billboards, trees and windows. Manufactured housing is particularly vulnerable to damage due to its lower construction standards.

Hail can be particularly damaging to agricultural concerns, including farm buildings, standing crops and livestock.

Hazard Mitigation Strategies

The goal of mitigating for hail is to reduce the amount of financial loss due to these incidents. Insurance is the most widely used adjustment for crop and property damages due to hail. Hail crop insurance is available from two sources: commercial stock and mutual companies and the Federal Crop Insurance Corporation (FCIC). Farmers rarely purchase insurance coverage up to the full value of the losses that would result from a severe hailstorm.

The Richland County U. W. Extension Office distributes information on various hail insurance options. In the event of major damage, a team composed of county and federal agricultural agency representatives and the county emergency management director have primary responsibility for assessing and documenting hail damage.

The Richland County Emergency Management Office provides hail information to the public as part of the spring severe weather awareness week. The office also provides information about hail on the website and in display racks. The Public Health Department

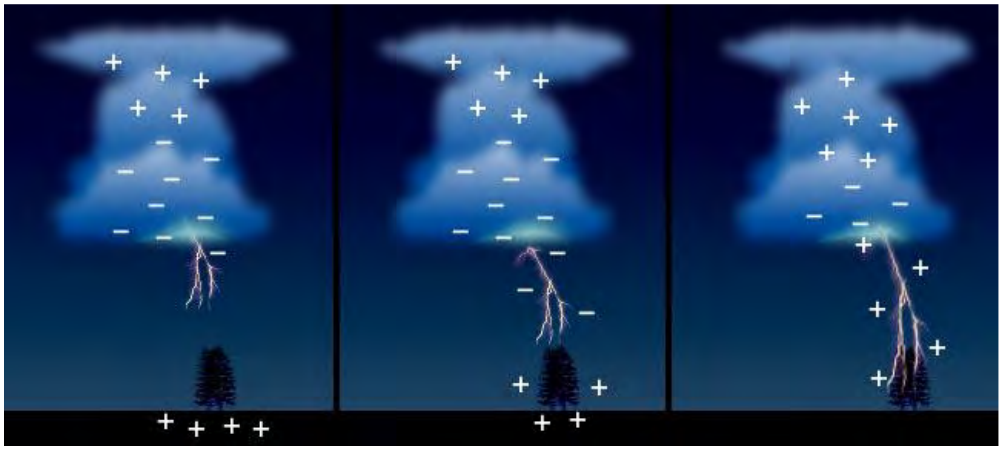
and Emergency Management Department also issue joint public service announcements (PSAs) on the local radio station (WRCO 100.9 FM and 1450 AM) when needed. Federal emergency assistance is available in the form of low-interest loans when a Presidential Disaster is declared or when the United States Department of Agriculture (USDA) declares that a county is eligible for aid. Damage from hailstorms alone is generally not extensive enough to invoke a disaster declaration.

The hazard mitigation strategies listed above primarily involve providing information on safety measures and insurance to the public for agricultural concerns and residential and commercial structures. These measures provide basic safety information but, since there is little one can do to prevent hail damage, these measures will do little to reduce damages to existing or future buildings and infrastructure but the recommended insurance may make recovery easier.

Storms: Lightning

Lightning is a phenomenon associated with thunderstorms; the action of rising and descending air separates and builds-up positive and negative charge areas. When the built-up energy is discharged between the two areas, lightning is the result.[92]

Formation of Lightning



Lightning may travel from cloud to cloud, cloud to ground, or if there are high structures involved, from ground to cloud.

Physical Characteristics

The temperatures in a lightning stroke rise to 50,000°F (Fahrenheit). The sudden and violent discharge which occurs in the form of a lightning stroke is over in one-millionth of a second.

Lightning damage occurs when humans and animals are electrocuted, fires are caused by a lightning stroke, materials are vaporized along the lightning path or sudden power surges cause damage to electrical or electronic equipment. Lightning, an underestimated hazard, kills more people in an average year than do hurricanes or tornadoes.

[92] University Corporation for Atmospheric Research [UCAR]

Frequency of Occurrence

Nationwide, forty-five percent of the people killed by lightning have been outdoors, about sixteen percent were under trees, six percent were on heavy road equipment and thirty-three percent were at various unknown locations. Less than ten percent of the deaths involved individuals inside buildings; these deaths were primarily due to lightning-caused fires.

Wisconsin has a high frequency of property losses due to lightning. The NWS quotes the Vaisala Group saying that an average of 300,000 cloud-to-ground strikes hit Wisconsin per year. Nationally, Wisconsin ranks 28th in lighting related fatalities with 6 deaths reported between 2001 and 2010. There were lightning fatalities in Wisconsin in 2007, 2008, and 2011, but no fatalities or injuries reported in Richland County from lightning since 1982. Insurance records show that annually one out of every fifty farms has been struck by lightning or had a fire which may have been caused by lightning. Generally, rural fires are more destructive than urban fires because of limited lightning protection devices, isolation, longer response times and inadequate water supplies.

According to the National Weather Service, from 1844 – 2015, Richland County reported 2 lightning events but fortunately none have led to loss of life or injury. Lightning can occur county-wide in Richland County. The likelihood of a lightning event is considered high but the severity of effects should it happen is considered low.

There were no lightning events recorded by the National Weather Service between 1 January 1950 and 31 January 2016.[93]

Vulnerability

Lightning, which often occurs in conjunction with thunderstorms and hail, can damage many types of infrastructure, including electric lines/poles/transformers, telephone lines and radio communication equipment. These pieces of infrastructure are needed by both first response agencies and the general community to ensure safe transport; warm, safe homes and good internal and external communications abilities.

[93] http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=55%2CWISCONSIN

Residential and business properties are liable to receive damage either as a result of a lightning strike causing a fire or other type of direct damage or by overloading electronic equipment (e.g., computers, televisions) that have not been properly connected to a surge protector. The latter concern is especially important to business and government, which in modern America rely on computers and other electronic equipment to manage the large amounts of data manipulated in our information-based economy.

Lightning can damage agricultural assets including farm buildings, standing crops and livestock. It is also one of the major sources of ignition for forest and wildfires.

Hazard Mitigation Strategies

The goal of lightning mitigation activities is to reduce, in a cost effective manner, the loss of lives and property due to these events. The two primary ways to effectively reduce lightning losses are modifying human behavior and protecting structures (e.g., using fire resistant materials in building construction). The use of fire resistant materials will make existing buildings and future construction less likely to catch fire or will minimize fire damage and spread due to lightning strike. Surge protectors limit data losses.

The Richland County Emergency Management Office has awareness and educational materials on the above topics in a display rack and will be placing links on the website that inform the public of safety procedures to follow during a lightning storm. Severe summer weather safety information is also emphasized during Tornado Awareness Week.

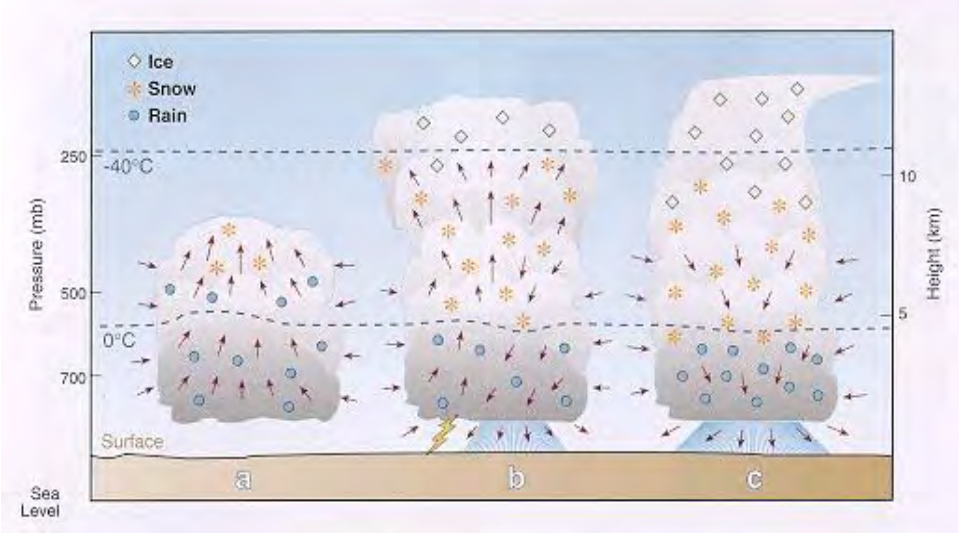
Storms: Thunderstorms

There are three distinct stages of development for thunderstorms (birth, growth, maturity), each of which can be seen in the following schematic.

In the first stage of development, an updraft drives warm air up beyond condensation levels where clouds form.

The second stage of development occurs as levels of water vapor in the expanding cloud rise past saturation and the air cools sufficiently to form solid and liquid particles of water. At this point, rain or snow begins to fall within the cloud.

A thunderstorm's mature stage is marked by a transition of wind direction within the storm cells. The prevailing updraft which initiated the cloud's growth is joined by a downdraft generated by precipitation. Lightning may occur soon after precipitation begins. Hail and tornadoes may also develop during this stage.[94]



Physical Characteristics

A thunderstorm often is born, grows, reaches maturity and dies in a thirty-minute period. The individual thunderstorm cell often travels between thirty and fifty miles per hour. Strong frontal systems may create one squall line after another, each composed of many

[94] National Weather Service – Flagstaff, Arizona

individual thunderstorm cells. These fronts can often be tracked across the state from west to east with a constant cycle of birth, growth, maturity and death of individual thunderstorm cells.

Frequency of Occurrence

Thunderstorm frequency is measured as the number of days per year with one or more incidents. There are approximately 100,000 thunderstorms in the United States every year and approximately 10% of those are considered severe (i.e., has at least ¾" hail, winds of at least 58 mph or a tornado). Most Wisconsin counties, including Richland County, average between 30 and 40 thunderstorm days per year although a portion of southwestern and south-central Wisconsin average 40 to 50 thunderstorm days per year. In Richland County there are typically several severe thunderstorms per year. Thunderstorms can occur throughout the year with the highest frequency during the months of May through September. The majority of storms occur between the hours of noon and midnight with the most severe thunderstorm winds occurring in June or July between 4:00 – 8:00 p.m.

The probability of thunderstorms occurring in Richland County is very high as these storms usually occur one or more times each year during the summer in Wisconsin and Richland County.[95]

Severe Thunderstorm Watches		Severe Thunderstorm Warnings	
Year	**Number**	**Year**	**Number**
2013	7	2013	11
2012	5	2012	4
2011	10	2011	5
2010	12	2010	9
2009	4	2009	2
2008	12	2008	8

[95] https://www.weather.gov/media/arx/nathaz/RIChazards.pdf

2007	13	2007	7
2006	27	2006	12
2005	15	2005	5
2004	15	2004	4
2003	11	2003	6

Damage from thunderstorms usually is a result of the hail, lightning, winds and/or flash flooding that can occur as part of the storm. The likelihood of damage from these causes is in discussed in the appropriate chapters although one can see from the historical data listed below, property and crop damage occurs frequently in thunderstorms.

The following chart lists the thunderstorms and high wind events that have been recorded in Richland County by the National Weather Service between 1 January 1950 and 31 January 2016.[96]

Date	Location	Type	Death	Injury	Property Damage	Crop Damage
5/9/1963	Richland County	Tstm Wind	0	0	0	0
6/20/1974	Richland County	Tstm Wind	0	0	0	0
9/7/1980	Richland County	Tstm Wind	0	0	0	0
7/3/1983	Richland County	Tstm Wind	0	0	0	0
7/3/1983	Richland County	Tstm Wind	0	0	0	0
7/3/1983	Richland County	Tstm Wind	0	0	0	0
8/16/1983	Richland County	Tstm Wind	0	0	0	0
4/27/1984	Richland County	Tstm Wind	0	0	0	0
4/27/1984	Richland County	Tstm Wind	0	0	0	0
9/1/1984	Richland County	Tstm Wind	0	0	0	0
9/1/1984	Richland County	Tstm Wind	0	0	0	0
9/24/1984	Richland County	Tstm Wind	0	0	0	0
10/16/1984	Richland County	Tstm Wind	0	0	0	0
10/16/1984	Richland County	Tstm Wind	0	0	0	0
10/16/1984	Richland County	Tstm Wind	0	0	0	0
10/16/1984	Richland County	Tstm Wind	0	0	0	0
10/16/1984	Richland County	Tstm Wind	0	0	0	0
7/29/1987	Richland County	Tstm Wind	0	0	0	0
5/24/1989	Richland County	Tstm Wind	0	0	0	0
6/26/1989	Richland County	Tstm Wind	0	0	0	0

[96] http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=55%2CWISCONSIN

Date	Location	Type	Death	Injury	Property Damage	Crop Damage
6/26/1989	Richland County	Tstm Wind	0	0	0	0
6/26/1989	Richland County	Tstm Wind	0	0	0	0
8/4/1989	Richland County	Tstm Wind	0	0	0	0
4/27/1990	Richland County	Tstm Wind	0	0	0	0
8/25/1992	Richland County	Tstm Wind	0	0	0	0
5/23/1994	Gotham	Tstm Wind	0	0	0	5K
7/11/1994	West Lima	Tstm Wind	0	0	0	5K
6/7/1995	Richland Center	Tstm Wind	0	0	0	0
7/31/1995	Boaz	Tstm Wind	0	0	0	0
8/28/1995	Richland Center	Tstm Wind	0	0	0	0
8/7/1996	Viola	Tstm Wind	0	0	0K	0
8/7/1996	Yuba	Tstm Wind	0	0	1K	0
8/7/1996	Richland Center	Tstm Wind	0	0	0K	0
4/5/1997	Richland Center	Tstm Wind	0	0	5K	0
4/6/1997	Richland County	High Wind	0	0	45K	0
6/15/1997	Richland Center	Tstm Wind	0	0	10K	0
6/15/1997	Bear Valley	Tstm Wind	0	0	20K	0
7/1/1997	Richland Center	Tstm Wind	0	0	8K	0
9/16/1997	Richland Center	Tstm Wind	0	0	25K	0
5/31/1998	Viola	Tstm Wind	0	0	0	0
6/18/1998	Viola	Tstm Wind	0	0	1K	0
6/18/1998	Richland Center	Tstm Wind	0	0	30K	0
6/18/1998	Bloom City	Tstm Wind	0	0	15K	10K
6/27/1998	Yuba	Tstm Wind	0	0	20K	1K
7/19/1998	Richland Center	Tstm Wind	0	0	12K	0
7/20/1998	Boaz	Tstm Wind	0	0	10K	25K
11/10/1998	Richland County	High Wind	1	2	1.7M	0
5/16/1999	Richland Center	Tstm Wind	0	0	20K	0
6/1/2000	Cazenovia	Tstm Wind	0	0	5K	0
6/1/2000	Cazenovia	Tstm Wind	0	0	1K	0
10/25/2001	Richland County	High Wind	0	0	0	0
7/4/2003	Richland Center	Tstm Wind	0	0	2K	2K
8/20/2003	Lone Rock	Tstm Wind	0	0	0	0
6/10/2005	Richland Center	Tstm Wind	0	0	0K	0
6/24/2005	Richland Center	Tstm Wind	0	0	0K	0
6/29/2005	Richland Center	Tstm Wind	0	0	2K	0
6/29/2005	Richland Center	Tstm Wind	0	0	1K	0
6/29/2005	Richland Center	Tstm Wind	0	0	3K	0
7/25/2005	Five Pts	Tstm Wind	0	0	2K	5K
5/24/2006	Richland Center	Tstm Wind	0	0	1K	0
5/24/2006	Richland Center	Tstm Wind	0	0	4K	0
7/1/2006	Richland Center	Tstm Wind	0	0	0	0
7/1/2006	Richland Center	Tstm Wind	0	0	1K	0
7/20/2006	Cazenovia	Tstm Wind	0	0	1K	0
7/3/2007	Neptune	Tstm Wind	0	0	2K	3K

Date	Location	Type	Death	Injury	Property Damage	Crop Damage
7/3/2007	Ithaca	Tstm Wind	0	0	6K	3K
8/21/2007	Richland Center	Tstm Wind	0	0	2K	0K
9/18/2007	Yuba	Tstm Wind	0	0	5K	0K
9/18/2007	Richland Center	Tstm Wind	0	0	6K	0K
9/18/2007	Richland Center	Tstm Wind	0	0	8K	0K
9/21/2007	Ithaca	Tstm Wind	0	0	1K	0K
9/21/2007	Ashridge	Tstm Wind	0	0	0K	0K
6/7/2008	Hub City	Tstm Wind	0	0	1K	0K
6/7/2008	Cazenovia	Tstm Wind	0	0	1K	3K
7/10/2008	Richland Center	Tstm Wind	0	0	3K	1K
7/25/2008	Bosstown	Tstm Wind	0	0	1K	0K
7/25/2008	Gotham	Tstm Wind	0	0	4K	0K
7/27/2009	Five Points	Tstm Wind	0	0	2K	10K
8/9/2010	Basswood	Tstm Wind	0	0	15K	0K
8/9/2010	Loyd	Tstm Wind	0	0	20K	0K
8/20/2010	Lone Rock	Tstm Wind	0	0	.25K	0K
8/20/2010	Hub City	Tstm Wind	0	0	.25K	0K
5/22/2011	Basswood	Tstm Wind	0	0	20K	0K
5/22/2011	Richland Center	Tstm Wind	0	0	5K	0K
7/18/2012	Richland Center	Tstm Wind	0	0	5K	0K
7/25/2012	Orion	Tstm Wind	0	0	1K	0K
7/25/2012	Richland Airport	Tstm Wind	0	0	2K	0K
9/4/2012	Richland Center	Tstm Wind	0	0	4K	0K
5/19/2013	Tri Co Airport	Tstm Wind	0	0	0K	0K
5/29/2013	Richland Center	Tstm Wind	0	0	5K	0K
5/30/2013	Orion	Tstm Wind	0	0	2K	0K
6/12/2013	Port Andrew	Tstm Wind	0	0	0K	0K
9/19/2013	Gotham	Tstm Wind	0	0	.5K	0K
6/22/2015	Byrd's Creek	Tstm Wind	0	0	10K	0K
7/13/2015	Richland Center	Tstm Wind	0	0	15K	0K
7/13/2015	Richland Center	Tstm Wind	0	0	60K	0K
7/13/2015	Lone Rock	Tstm Wind	0	0	80K	0K

Vulnerability

Thunderstorms, which often produce hail and lightning and may occasionally spawn tornadoes, high wind storms or flash flooding, can damage many types of infrastructure. Richland County's thunderstorm vulnerabilities due to associated hail, lightning, winds and flood waters are discussed in the other hazard chapters of this plan.

Hazard Mitigation Strategies

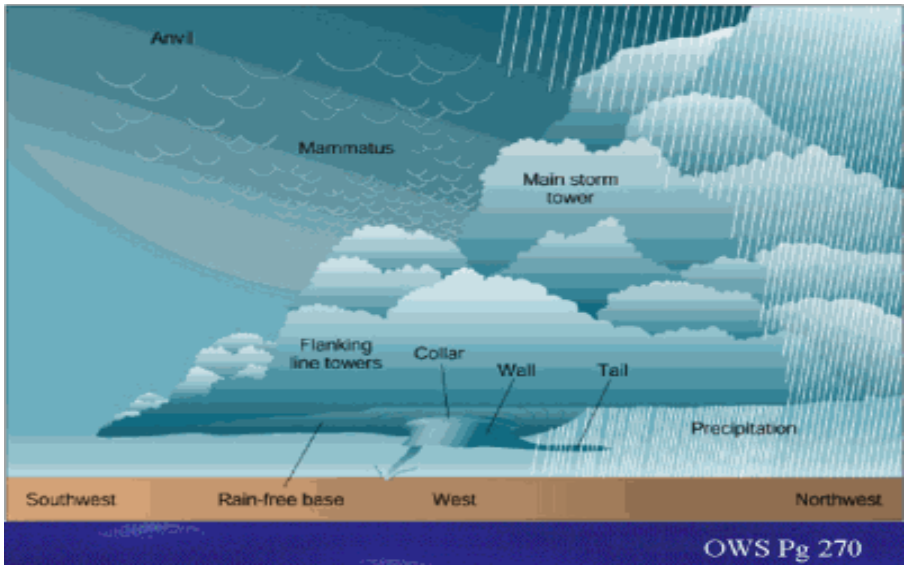
The goal of thunderstorm mitigation activities is to reduce, in a cost effective manner, the loss of lives and property due to these events. The Richland County Emergency Management Office has developed severe weather safety information that it disseminates to the public in a display rack and will provide online with the goal of protecting the lives and property of citizens. During Tornado Awareness Week, there is extensive media coverage of safety tips. The Emergency Management Department also provides public service announcements (PSAs) to the local radio station (WRCO 100.9 FM and 1450 AM).

The County Emergency Management Department also provides advice and other assistance to local event boards, the University of Wisconsin – Richland Center Campus and senior residence facilities (e.g., nursing homes, assisted living) regarding safety issues. This is especially important for some of the local events, such as the Star-Spangled Celebration and the State High School Rodeo, which can draw 15,000 – 20,000 people to the community. The Emergency Management Department has been active in helping these boards, upon request, and received a letter of commendation for their work monitoring for severe weather during the Star-Spangled Celebration.

The damage to buildings and infrastructure in a thunderstorm is generally caused by components of the storm such as hail, flooding, lightning or wind. A discussion of strategies to reduce effects on existing and future buildings and infrastructure is discussed in the chapters that discuss each of these components in detail.

Storms: Tornadoes and High Winds

A tornado is a violently rotating funnel-shaped column of air. The lower end of the column may or may not touch the ground. Average winds in the tornado are between 173 and 250 miles per hour but winds can exceed 300 miles per hour. It should also be noted that straight-line winds may reach the same speeds and achieve the same destructive force as a tornado.



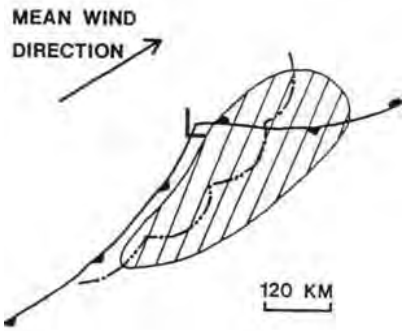
A derecho is a widespread, long-lived, violent, convectively-induced straight-line windstorm that is associated with a fast-moving band of severe thunderstorms usually taking the form of a bow echo. Derechos blow in the direction of movement of their associated storms; this is similar to a gust front except that the wind is sustained and generally increases in strength behind the "gust" front. A warm weather phenomenon, derechos occur mostly in summer, especially July, in the northern hemisphere. They can occur at any time of the year and occur as frequently at night as in the daylight hours.

The traditional criteria that distinguish a derecho from a severe thunderstorm are *sustained* winds of 58 mph during the storm as opposed to gusts, high and/or rapidly increasing forward speed and geographic extent (typically 250 nautical miles in length). In addition, they have a distinctive appearance on radar (bow echo); several unique features, such as the rear inflow notch and bookend vortex and usually manifest two or more downbursts. There are three types of derechos:

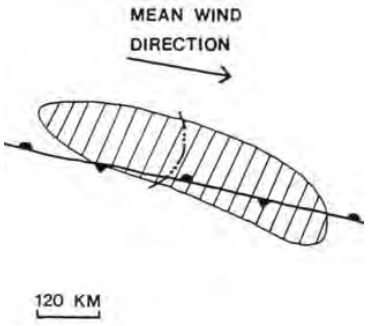
- Serial: Multiple bow echoes embedded in a massive squall line typically around 250 miles long. This type of derecho is usually associated with a very deep low. Also because of embedded supercells, tornadoes can easily spin out of these types of derechos.

- Progressive: A small line of thunderstorms take the bow-shape and can travel for hundreds of miles.

- Hybrid: Has characteristics of a serial and progressive derechos. Hybrid derechos are associated with a deep low like serial derechos but are relatively small in size like progressive derechos.[97]



Serial Derecho



Progressive Derecho

Physical Characteristics

Tornadoes are visible because low atmospheric pressure in the vortex leads to cooling of the air by expansion and to condensation and formation of water droplets. They are also visible as a result of the airborne debris and dust in its high winds. Wind and pressure differential are believed to account for ninety percent of tornado damage in most cases. Because tornadoes are associated with storm systems, they usually are accompanied by hail, torrential rain and intense lightning.

Tornadoes typically produce damage in an area that does not exceed one-fourth mile in width or sixteen miles in length. Tornadoes with track lengths greater than 150 miles have been reported although such tornadoes are rare.

[97] http://en.wikipedia.org/wiki/Derecho

Tornado damage severity is measured by the Fujita Tornado Scale, which assigns an "F" ("Fujita") value from 0 – 5 to denote the wind speed.

The Fujita Tornado Scale[98]		
Category	**Wind Speed**	**Description of Damage**
F0	40-72 mph	Light damage. Some damage to chimneys; break branches off trees; push over shallow-rooted trees; damage to sign boards.
F1	73-112 mph	Moderate damage. The lower limit is the beginning of hurricane speed. Roof surfaces peeled off; mobile homes pushed off foundations or overturned; moving autos pushed off roads.
F2	113-157 mph	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light-object missiles generated.
F3	158-206 mph	Severe damage. Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; cars lifted off ground and thrown.
F4	207-260 mph	Devastating damage. Well-constructed houses leveled; structures with weak foundations blown off; cars thrown and large missiles generated.
F5	261-318 mph	Incredible damage. Strong frame houses lifted off foundations and carried considerable distance to disintegrate; automobile-sized missiles fly through the air in excess of 100-yards; trees debarked.

On 1 February 2007, the National Weather Service began rating tornadoes using the EF-scale. It is considerably more complicated than the F-scale and it will allow surveyors to create more precise assessments of tornado severity. Below is a comparison between the Fujita Scale and the EF Scale:

Fujita Scale			Derived EF Scale		Operational EF Scale	
F Number	**Fastest ¼ mile (mph)**	**3 Second Gust (mph)**	**EF Number**	**3 Second Gust (mph)**	**EF Number**	**3 Second Gust (mph)**
0	40-72	45-78	0	65-85	0	65-85
1	73-112	79-117	1	86-109	1	86-110
2	113-157	118-161	2	110-137	2	111-135
3	158-207	162-209	3	138-167	3	136-165
4	208-260	210-261	4	168-199	4	166-200
5	261-318	262-317	5	200-234	5	Over 200

Downburst Characteristics

Downburst damage is often highly localized but resembles damage caused by a tornado. In some cases, even an experienced investigator cannot identify the nature of a storm without mapping the direction of the damaging winds over a large area. There are significant interactions between tornadoes and nearby downbursts.

[98] FEMA, 1997

A classic downburst example occurred on 4 July 1977 when a severe thunderstorm moved across Northern Wisconsin. Extensive areas of tree and property damage, somewhat like a tornado, were reported. After an aerial survey was completed to map both direction and F-scale intensity of the damaging winds it was determined that no evidence of a tornado was found anywhere within the path of the damage swath, which was 166 miles long and 17 miles wide. The survey revealed that there were scattered local centers from which straight-line winds diverged outward. These local wind systems were identified as downbursts with at least 25 specific locations recognized by the low-flying aircraft.

Frequency of Occurrence

Wisconsin lies along the northern edge of the nation's tornado belt, which extends north-eastward from Oklahoma into Iowa and across to Michigan and Ohio. Winter, spring and fall tornadoes are more likely to occur in southern Wisconsin, which includes Richland County, than in northern counties.

Wisconsin's tornado season runs from the beginning of April through September with the most severe tornadoes typically occurring in April, May and June. Richland County has had tornadoes from the months of May through October, with most (6) occurring in August. Tornadoes have, however, occurred in Wisconsin during every month except for February. Many tornadoes strike in late afternoon or early evening (i.e., from 3:00 – 9:00 p.m.) but they do occur at other times. Deaths, injuries and personal property damage have occurred and will continue to occur in Wisconsin. Richland County has recorded no deaths and nine injuries due to tornadoes since 1950 and the hazard is considered a county-wide hazard since tornadoes and high winds can occur anywhere in the county.

According to the National Weather Service, Richland County had two funnel clouds, no water spouts and 13 tornadoes between 1 January 1950 and 31 January 2016.[99] Between these dates, the county had no deaths, nine injuries and approximately $3.5 million in damages due to these storms. The probability of Richland County being struck by a tornado in the future is medium and the likelihood of damage from future tornadoes is high. All parts of Richland County are equally susceptible to tornadoes.

[99] http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=55%2CWISCONSIN

Date	Location	Type	Mag	Death	Injury	Property Damage	Crop Damage
7/3/1951	Richland County	Tornado	F2	0	0	25K	0
5/8/1964	Richland County	Tornado	F2	0	0	0K	0
5/8/1964	Richland County	Tornado	F2	0	2	250K	0
9/3/1964	Richland County	Tornado	F3	0	4	250K	0
8/1/1967	Richland County	Tornado	F1	0	0	25K	0
6/13/1972	Richland County	Tornado	F1	0	0	25K	0
8/11/1972	Richland County	Tornado	F1	0	0	25K	0
6/26/1973	Richland County	Tornado	F1	UKN	UKN	UKN	UKN
5/8/1988	Richland County	Tornado	F2	0	0	250K	0
8/18/2005	Viola	Tornado	F2	0	3	2.5M	75K
8/18/2005	Orion	Tornado	F0	0	0	100K	25K
5/24/2006	Richland Center	Tornado	F0	0	0	5K	0
3/31/2007	Richland Center	Funnel Cloud	NA	0	0	0K	0K
5/22/2013	Richland Airport	Funnel Cloud	NA	0	0	0K	0K
6/22/2015	Westport	Tornado	EF0	0	0	30k	0K
7/13/2015	Lone Rock	Tornado	EF0	0	0	10k	0K

The following chart lists the four high wind events that have been recorded in Richland County by the National Weather Service between 1 January 1950 and 31 January 2016.[100] During the same time period, there were no listed strong wind events.[101]

Year	Date	Location	Human Losses	Damage Losses	Magnitude
1997	4/6	Richland Co.	Death/Injury: 0	Property/Crop: $0	56 knots
1998	11/10	Richland Co.	Death/Injury: 0	Property: $200K Crop: $0	58 knots
2001	10/25	Richland Co.	Death/Injury: 0	Property/Crop: $0	40 knots E
2010	10/27	Richland Co.	Death/Injury: 0	Property: $7K Crop: $0	52 knots EG

M = Measured; MG = Measured Gust

According to the NWS historical records, Richland County has never had an F5/EF5 tornado and they have only had one F4/EF4. This tornado occurred in May, 1918 when a tornado formed in northeastern Iowa and tracked across southwestern Wisconsin. The storm hit Lone Rock, killing four people and destroying much of the town before collapsing near Baraboo. On August 18, 2005 another significant tornado, one of 27 recorded in Wisconsin on that day, hit the Village of Viola causing major damage and injuring

[100] http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=55%2CWISCONSIN
[101] http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=55%2CWISCONSIN

three people. The storm continued east, destroying additional trees and structures before lifting west of Hub City.

Vulnerability

Injury to people is a primary concern in tornado and high wind events. Two of the highest risk places are mobile home parks and campgrounds; Richland County has several of each type of property. Both have high concentrations of people in a small area, generally have structures that provide less protection than standard construction homes generally do not provide storm shelters. Other places of concern during these types of events include critical emergency facilities such as hospitals and public works/highway garages, police stations and fire departments, which contain equipment and services needed by the public after a tornado.

Schools, in addition to holding children, are the major type of structure used as community disaster shelters and their loss might therefore affect the community on several levels (e.g., the death or injury of children, the loss of a community housing shelter). School gymnasiums are often the specific location of the community shelter but they are especially vulnerable in tornadoes because the large-span roof structure is often not adequately supported.

Community infrastructure such as power lines, telephone lines, radio towers and street signs are often vulnerable to damage from tornadoes and high winds and can be expensive to replace. The loss of radio towers that hold public safety communications repeaters can adversely impact the ability of first responders to mount an effective response; damage to towers that hold public media equipment may adversely impact the ability to distribute adequate public information.

Residential property is likely to have siding and roofing materials removed, windows broken from flying debris and garages blown down due to light construction techniques. Perhaps one of the largest types of loss on private property is due to tree damage, which is generally not covered by federal disaster assistance.

Business properties are at risk for having damage to infrastructure including signs, windows, siding and billboards. Agricultural buildings, such as barns and silos, are also generally not constructed in a manner that makes them wind resistant, which can

lead to the loss of livestock and harvest. Standing crops are also at risk from high winds and tornadoes.

The Wisconsin Hazard Mitigation Plan tornado loss estimates for Richland County are that from 1950 – 2010 there were 11 tornadoes that caused $3.455M[102] in property damages. The average loss per tornado was $314,091 and the estimated annual future loss is $56,639. The annual probability of a tornado is 18.033%. There were no deaths and nine injuries during that period; the annual probability of death is then 0% and a 14.75% chance of injury. The estimated annual loss due to injury is $7,525 equaling an estimated annual loss of both property and injury to $64,164.[103]

Hazard Mitigation Strategies

The goal of tornado and high wind mitigation activities is to reduce, in a cost effective manner, the loss of lives and property due to these events. Richland County has some history of damage to buildings and infrastructure due to tornadoes and high winds. Some strategies below will deal with public information and alert and notification while others will enable the community to make current and future buildings and infrastructure more disaster-resistant by enacting more “bricks and mortar” solutions. Richland County has developed the following hazard mitigation strategies:

- An effective warning system is the single most important resource for alerting the public to a tornado hazard, which is critical to the main goal of saving lives and reducing property losses. Forecasting of tornadoes is difficult, however, because of the suddenness of their onset, their relatively short duration, the extreme variability of a tornado striking area, limited knowledge of tornado dynamics and the limitations of the weather observation system. Tornado sirens are municipally owned and maintained in Richland County although some are activated by the county. A fuller discussion of the improvements to the warning sirens in the county can be found in the All-Hazards Section of this plan. The Emergency Management Office promotes the use of NOAA weather radios for public alert and notification. The office also continues to evaluate various technologies to

[102] Note that all dollar figures in this paragraph are reported in 2008 dollars.
[103] Wisconsin State Hazard Mitigation Plan

determine if they can be effectively integrated into the county's alert and notification systems.

- During the past several years, there has been a statewide Tornado Awareness Week in late March or April. Media information packets are distributed to reemphasize and alert the public to tornado warning procedures. Richland County actively promotes tornado safety public information as well as other summer severe weather public awareness and educational efforts and will include applicable links on the county website's preparedness page specifically aimed at schools, homes and businesses. Richland County also assists the National Weather Service (NWS) with sponsoring tornado spotter training and in organizing local tornado spotter networks. The NWS also works with the county to provide a tornado packet of public information that includes a county map with a vulnerability analysis.

- As part of the tornado preparedness program, the county plans to work with the municipalities as requested to explore the feasibility of increasing the wind resistance of the roofs of community storm shelters.

- Explore the feasibility of hardening the Lone Rock Elementary School (K-5) structure to withstand greater stress from winds or to creating an adjacent tornado shelter since the school is a shelter for the children and is a resource for the wider community.

- The county and its municipalities recognizes that mobile home parks and campgrounds are particularly vulnerable locations for people and property during a tornado. To help mitigate the danger, they would like to consider projects such as providing information to mobile home park owners and park/campground operators, via a website link, about providing permanent storm shelters in the communities. One style of shelter holds approximately ten people and costs $3,000. There are mobile home parks in the City of Richland Center and in the Villages of Lone Rock, Sextonville and Viola and in the Town of Rockbridge. The Village of Lone Rock would like to install two shelters in the community at the K-6 school and at the River Rock Trailer Park on Highway 14. The Village of Cazenovia is also considering one shelter. The Alma Springs, Flying J and Eagle Cave are the campgrounds in the county. The Eagle Cave

campground is in the County's NWS-identified "tornado alley" and is a priority for providing information. The county would also be willing to partner with these private agencies to seek grant funding, such as U.S. Department of Commerce Community Development Block Grant (CDBG) grants for these types of improvements.

Storms: Winter

Due to its position along the northern edge of the United States, Wisconsin, including Richland County, is highly susceptible to a variety of winter weather storm phenomena.

Picture of snow drifts after the "Groundhog Day Blizzard" in 2011.[104]

Physical Characteristics

The National Weather Service descriptions of winter storm elements are:

- Heavy snowfall - Accumulation of six or more inches of snow in a 12-hour period or eight or more inches in a 24-hour period.
- Blizzard - An occurrence of sustained wind speeds in excess of 35 miles per hour (mph) accompanied by heavy snowfall or large amounts of blowing or drifting snow.
- Ice storm - An occurrence of rain falling from warmer upper layers of the atmosphere to the colder ground, freezing upon contact with the ground and exposed objects near the ground.
- Freezing drizzle/freezing rain - Effect of drizzle or rain freezing upon impact on objects with a temperature of 32 degrees Fahrenheit or below.

[104] http://readywisconsin.wi.gov/news/Top%20Weather%20Events%20in%20Wisconsin%20for%202011.pdf

- Sleet - Solid grains or pellets of ice formed by the freezing of raindrops or the refreezing of largely melted snowflakes. This ice does not cling to surfaces.
- Wind chill - An apparent temperature that incorporates the combined effect of wind and low air temperatures on exposed skin.

In Wisconsin, the winter storm season generally runs from November through March and Wisconsin residents are most familiar with heavy snowstorms, blizzards, sleet and ice storms. The majority of Wisconsin snowfalls are between one and three inches per occurrence, although heavy snowfalls that produce at least ten inches may occur four or five times per season. Northwestern Wisconsin encounters more blizzards than the southeastern portions of the state.

Damage from ice storms can occur when more than half an inch of rain freezes on trees and utility wires, especially if the rain is accompanied by high winds. Another danger comes from accumulation of frozen rain pellets on the ground during a sleet storm, which can make driving hazardous.

Frequency of Occurrence

Annual snowfall in Wisconsin varies between thirty inches in southern counties to one hundred inches in the north. In Wisconsin, the bulk of snow in falls between December and March and the largest winter storms tend to form over the southern Rockies or the central or southern Plains, then move northeast towards the western Great Lakes producing usually six to twelve inches. Low pressure systems originating in the northwest (Alberta) tend to produce only light snowfalls of two to four inches. Snowfalls associated with Alberta lows occur more frequently with colder weather.

Although massive blizzards are rare in Wisconsin, blizzard-like conditions often exist during heavy snowstorms when gusty winds cause blowing and drifting of snow. For example, blizzard conditions existed in Wisconsin in February, 2011 when record snowfalls were recorded in many areas and very strong northeast winds were gusting from 45 to 60 mph for an extended period of time. Richland County received from 15 up to 30 inches associated over this three-day storm. It should be noted that there were two additional large snow storms that occurred in late February and late

March of 2011.[105] Another example is from January, 1979 when near blizzard conditions existed in Wisconsin and record snowfalls were recorded in many areas and wind speeds gusted to over thirty miles per hour.

The terrain of Richland County limits the number of true blizzards (three since 1982) but heavy snow, blowing snow, ice and sleet all regularly occur. The table below shows the top five season snowfalls as recorded in Richland Center by the NWS.

TOP FIVE SEASONAL SNOWFALLS IN RICHLAND CENTER[106]

YEAR	SNOWFALL
2007-2008	74.5”
1950-1951	73.3”
1958-1959	72.1”
1928-1929	71.1”
1970-1971	70.3”

According to the National Weather Service, there are occasions in Richland County where milder daytime temperatures in valleys produce rain when a wintry mix or snow is falling on ridges and blowing snow is also more common on ridge tops. The record for one-day snowfall in Richland Center was 15.0 inches set on March 28, 1931. On February 23-25, 2007, a major winter storm impacted Richland County. Heavy snow, including lightning, brought over a foot of snow (12.8”) over a two day period. Winds also increased and created major blowing and drifting. Some sleet and freezing rain fell during the middle of the storm, followed by another round of heavy snow and blizzard conditions. December 2008 was also very snowy, with 30.8” making it the 2nd snowiest December recorded. March can also be a snowy month and, although snowfall may be less frequent, heavy wet snow can form from large spring storms. In 1959, a total of 31.9” of snow fell in March alone.

Both ice and sleet storms can occur at any time throughout the winter season from November to April. Ice storms (1/4” of ice or more) can occur but are relatively rare with only 6 occurrences since 1982. Ice storms of disastrous proportions occurred in central Wisconsin in February 1922 and in southern Wisconsin in March

[105] http://readywisconsin.wi.gov/news/Top%20Weather%20Events%20in%20Wisconsin%20for%202011.pdf and http://www.crh.noaa.gov/mkx/?n=020211_blizzard
[106] https://www.weather.gov/media/arx/nathaz/RIChazards.pdf

1976. A Presidential Disaster Declaration occurred as a result of the 1976 storm. Utility crews from surrounding states were called in to restore power, which was off for up to ten days in some areas. Other storms of lesser magnitude caused power outages and treacherous highway conditions.

Both ice and sleet storms can occur at any time throughout the winter season from November to April. Ice storms of disastrous proportions occurred in central Wisconsin in February 1922 and in southern Wisconsin in March 1976. A Presidential Disaster Declaration occurred as a result of the 1976 storm. Utility crews from surrounding states were called in to restore power, which was off for up to ten days in some areas. Other storms of lesser magnitude caused power outages and treacherous highway conditions.

The probability that there will be severe winter storms in Richland County is high and the likelihood that those storms will cause significant damage is medium.

The following tables detail Richland County's winter storm statistics as reported by the National Weather Service, including human loss and injury and property damage estimates, from 1 January 1996 through 31 January 2016.[107]

BLIZZARDS

Year	Date	Location	Human Losses	Damage Losses
2007	02/24	Richland Co.	Death/Injury: 0	Property/Crop: $0
2008	02/17	Richland Co.	Death/Injury: 0	Property/Crop: $0
2010	12/11	Richland Co.	Death/Injury: 0	Property/Crop: $0
2012	12/20	Richland Co.	Death/Injury: 0	Property/Crop: $0

ICESTORM

Year	Date	Location	Human Losses	Damage Losses
1998	01/04	Richland Co.	Death/Injury: 0	Property/Crop: $0
2001	02/07	Richland Co.	Death/Injury: 0	Property/Crop: $0
2001	02/24	Richland Co.	Death/Injury: 0	Property/Crop: $0
2009	03/08	Richland Co.	Death/Injury: 0	Property/Crop: $0

HEAVY SNOW

Year	Date	Location	Human Losses	Damage Losses
2007	01/21	Richland Co.	Death/Injury: 0	Property/Crop: $0

[107] http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=55%2CWISCONSIN

2008	01/21	Richland Co.	Death/Injury: 0	Property/Crop: $0
	02/14	Richland Co.	Death/Injury: 0	Property/Crop: $0
	03/21	Richland Co.	Death/Injury: 0	Property/Crop: $0
2010	12/03	Richland Co.	Death/Injury: 0	Property/Crop: $0
2013	03/05	Richland Co.	Death/Injury: 0	Property/Crop: $0
	12/22	Richland Co.	Death/Injury: 0	Property/Crop: $0
2015	03/22	Richland Co.	Death/Injury: 0	Property/Crop: $0

WINTER STORM

Year	Date	Location	Human Losses	Damage Losses
1996	11/20	Richland Co.	Death/Injury: 0	Property/Crop: $0
	12/23	Richland Co.	Death/Injury: 0	Property/Crop: $0
1997	01/15	Richland Co.	Death/Injury: 0	Property/Crop: $0
	02/04	Richland Co.	Death/Injury: 0	Property/Crop: $0
	03/13	Richland Co.	Death/Injury: 0	Property/Crop: $0
1998	03/08	Richland Co.	Death/Injury: 0	Property/Crop: $0
1999	01/01	Richland Co.	Death/Injury: 0	Property/Crop: $0
	03/08	Richland Co.	Death/Injury: 0	Property/Crop: $0
2000	12/11	Richland Co.	Death/Injury: 0	Property/Crop: $0
	12/18	Richland Co.	Death/Injury: 0	Property/Crop: $0
2001	02/08	Richland Co.	Death/Injury: 0	Property/Crop: $0
2002	03/01	Richland Co.	Death/Injury: 0	Property/Crop: $0
2003	02/02	Richland Co.	Death/Injury: 0	Property/Crop: $0
	03/04	Richland Co.	Death/Injury: 0	Property/Crop: $0
	04/07	Richland Co.	Death/Injury: 0	Property/Crop: $0
	12/09	Richland Co.	Death/Injury: 0	Property/Crop: $0
2004	02/05	Richland Co.	Death/Injury: 0	Property/Crop: $0
2005	01/04	Richland Co.	Death/Injury: 0	Property/Crop: $0
	01/21	Richland Co.	Death/Injury: 0	Property/Crop: $0
	03/17	Richland Co.	Death/Injury: 0	Property/Crop: $0
2006	02/15	Richland Co.	Death/Injury: 0	Property/Crop: $0
2007	02/23	Richland Co.	Death/Injury: 0	Property/Crop: $0
	04/10	Richland Co.	Death/Injury: 0	Property/Crop: $0
	12/01	Richland Co.	Death/Injury: 0	Property/Crop: $0
	12/22	Richland Co.	Death/Injury: 0	Property/Crop: $0
2008	02/05	Richland Co.	Death/Injury: 0	Property/Crop: $0
	02/17	Richland Co.	Death/Injury: 0	Property/Crop: $0
	12/08	Richland Co.	Death/Injury: 0	Property/Crop: $0
	12/18	Richland Co.	Death/Injury: 0	Property/Crop: $0
	12/20	Richland Co.	Death/Injury: 0	Property/Crop: $0
2009	12/08	Richland Co.	Death/Injury: 0	Property/Crop: $0
2010	12/11	Richland Co.	Death/Injury: 0	Property/Crop: $0
2011	02/01	Richland Co.	Death/Injury: 0	Property/Crop: $0
	02/20	Richland Co.	Death/Injury: 0	Property/Crop: $0
2013	01/27	Richland Co.	Death/Injury: 0	Property/Crop: $0
	01/30	Richland Co.	Death/Injury: 0	Property/Crop: $0
2015	12/28	Richland Co.	Death/Injury: 0	Property/Crop: $0

WINTER WEATHER

Year	Date	Location	Human Losses	Damage Losses
2009	01/03	Richland Co.	Death/Injury: 0	Property/Crop: $0
2010	01/21	Richland Co.	Death/Injury: 0	Property/Crop: $0
	12/20	Richland Co.	Death/Injury: 0	Property/Crop: $0

Vulnerability

Winter storms present a serious threat to the health and safety of affected citizens and can result in significant damage to property. Heavy snow or accumulated ice can cause the structural collapse of homes, commercial buildings and agricultural structures; down power lines or isolate people from assistance or services by impeding transportation by the general public, emergency responders and public transportation resources.

The loss of electrical service and/or the blocking of transportation routes can adversely affect the ability of commercial enterprises to conduct business. This economic injury may be felt by both the business owner and employees unable to work during this period.

Hazard Mitigation Strategies

The goal of winter storm mitigation activities is to reduce, in a cost effective manner, the loss of lives and property due to these events. Communities prepare for severe winter weather by ensuring that plowing and sanding equipment is operational and available to handle potential emergencies. Funding is budgeted for the overtime hours of extra personnel but in a large emergency this may not be adequate. Redundant communication modes (e.g., radio, telephone) exist between government, police, fire, EMS, hospitals and highway departments. The Richland County Emergency Operations Plan provides for coordination of public safety support agencies such as the American Red Cross and for resource acquisitions during winter emergencies.

Winter safety information is prepared and distributed to the media and the public by the Richland County Emergency Management Office during Winter Awareness Week in November. Preparedness information is also available from display racks in the courthouse and will be included on the preparedness page of the website.

During a storm, the public is advised to monitor local radio, television and NOAA weather alert radios for up-to-date forecasts and the Sheriff's Office will release public service announcements (PSAs) on the local radio station (WRCO 100.9 FM and 1450 AM).

The hazard mitigation strategies listed above primarily involve providing information on general safety measures to the public. These measures provide basic safety information but, since the response to winter storms is primarily a government and/or corporate function comprised of tasks such as clearing roads of snow and ice and repairing downed utility lines, there are few measures that can be employed to reduce damages to existing or future buildings and infrastructure.

Utility Failure

A utility emergency is a disruption to the building services, usually defined as electrical power, water, natural gas and/or sewage, which restricts the ability of people to safely occupy the facility. Electrical power or natural gas outages are often caused by a fuel shortage caused by an oil embargo, power failure or natural disaster. Disruptions to the water and sewage systems are often the direct result of a natural disaster (e.g., flooding) or are indirect losses due to another failure (e.g., a power outage disrupts the pumping of water and/or sewage).

Physical Characteristics

Modern society is very dependent on electrical power for normal living and is therefore quite disrupted by loss of power. Most power outages last about fifteen minutes to one hour. If longer, the utilities will inform the local news media of the anticipated duration of the outage.

Except for three locations, the majority of Richland County is part of the Alliant/ Wisconsin Power and Light Company, which serves the southern and eastern sections of the county, or the Richland Electric Cooperative, which serves the north and western portions of the county. The other electric utilities are the Richland Center Electric Utility serving an area immediately around the City of Richland Center, the Viola Municipal Water and Electric Utility and the Muscoda Water and Light Utility, which serves a small area at the south-central portion of the County adjacent to the Village of Muscoda. One major East-West and two North-South electric transmission lines cross the County. There are eight electrical substations located along these lines in the County. The Northern Natural Gas Pipeline runs north/south through the county up to Richland Center. Natural gas is provided to roughly half the county by a number of providers including Madison Gas and Electric, Wisconsin Gas and Midwest Natural Gas, Inc. Refer to Alliant Energy, the Richland Electric Cooperative, the Richland Center Electric Utility, Muscoda Light and Water Utility, Madison Gas and Electric, Wisconsin Gas and Midwest Natural Gas for more

detailed information on and mapping of power plants and transmission lines.

Electrical substation

Thunderstorms with lightning are a possible cause of power failure. Fuel shortages can be caused by localized imbalances in supply. Labor strikes, severe cold weather or snowstorms also can cause a local shortage.

The water and sewage systems are most often a function of a municipal system and are usually found in more urbanized areas. Rural water is often provided by individual wells found on each property and sewage is managed by a septic system, also found on each individual property. Both municipal and individual systems are vulnerable to flooding, which can overwhelm the sewage systems and contaminate both municipal and private wells. Both types of systems are also vulnerable to electrical power loss because the electrical system powers the pumps and lift stations that move and treat the water and sewage.

Frequency of Occurrence

Richland County has several short power outages (i.e., lasting less than six hours) per year but does not have a history of extended power outages. The possibility always exists that a man-made or natural disaster could affect the power system for an extended period of time and since this can occur anywhere in the county, it is considered a county-wide hazard.

In general, Richland County has a low likelihood of utility failures with a medium risk of damage, death or injury due to a loss. Obviously, power outages are more likely to occur and the severity is greater in areas of higher human population (i.e., urban areas) but the loss of power to rural customers, while affecting fewer people, generally lasts longer and can be as life-threatening, especially if a person with special needs (e.g., the elderly, the young, those on special medical equipment) is involved.

Vulnerability

The failure of a utility to function can have wide-ranging impact in Richland County. People, especially special needs populations, in residential properties may not be able to safely live in their homes because of inadequate heat, the inability to cook, etc. Businesses, including the utilities themselves, may lose money due to the inability to produce goods and services for which they can bill. While there are generally back-up generators on sewage lift stations in Richland County, other utilities may also be non-operational due to damaged infrastructure, which can be very expensive to replace and/or repair. Critical infrastructure such as hospitals, schools, and governmental facilities may not be able to operate or may have to operate at a reduced capacity due to the loss of utility services. Facilities with hazardous materials that are required to report under the Emergency Planning and Community Right-to-Know Act (EPCRA) may not be able to adequately control and contain their chemicals and there may be a release of hazardous materials that can impact people or the environment.

Agricultural assets may be impacted by the loss of utilities because animals require fresh water, extreme temperatures reduce the production volume of and products such as milk may not be able to be properly stored. Modern farms also require on a large amount of automation for feeding, watering, and managing the wastes of the facility.

Finally, transportation on roadways may become unsafe due to the loss of directional and street lights.

Hazard Mitigation Strategies

The goal of utility failure mitigation activities is to reduce, in a cost effective manner, the loss of lives and property due to these events. Richland County has worked directly with the utility companies and emergency responders to formulate emergency management plans. During a fuel or power shortage, residents, schools, industry and businesses will be asked to take measures to conserve fuel. If the fuel shortage reaches a critical stage, all non-essential facilities will be closed and contingency plans will be activated.

In the event of a prolonged power outage, Richland County has generators available to provide power for radio communication and EOC operation. Evacuation and shelter arrangements have been prepared in case of a severe power outage. It should be noted that schools are often top choices as community disaster shelters but none of the county's schools have back-up generators. The Richland County Emergency Management Office would like to complete a feasibility study (including a cost-benefit analysis) to selectively upgrade shelter facilities for electricity needs in Richland Center (the middle and high schools), Lone Rock and Viola.

Other projects include:

- There are six sewer lift-station locations in the City of Richland Center, none of which have generator back-up. The city would like to install two permanent generators and to have four, trailer-mounted portable generators to address this need. This grant-funded project will require $35,000 to $40,000 per unit for the two permanent generators and approximately $90,000 each for the four portable generators and trailers.

- There are three electrical improvement projects that the City of Richland Center would like to accomplish:

    - Upgrade the Olson substation because it is at the end of its life-span. This is one of two substations that power Richland Center. If the substation fails in a storm, electrical power would be disrupted. This would disrupt business, homes and if it happened during a

period of extreme temperatures, could cause injuries and/or deaths.

- Install a loop feed system into the North Industrial park, which would support the back-up of Wells #6, 7 and 8 as well as the Campus, Allison Park and North Industrial Park Lift Stations. It would also provide a third contingency back-up to the Richland Hospital should other power lines be damaged.

- Explore improving the electrical power delivery system to provide an underground link to a second substation as a back-up for the Richland Hospital and its neighborhood. The hospital is critical infrastructure – the only hospital, which is a Level IV Trauma Center, in the area. The hospital has a back-up generator but it only powers limited functions (e.g., surgeries are halted). There are two power links but both go to the same substation.

- The Richland Electric Cooperative would like to replace overhead primary electrical lines with underground lines as areas of need are identified and budgetary support is secured.

Non-Natural Disasters

As the communities in Richland County completed their risk assessments, a non-natural disaster, Hazardous Materials Incidents, came to light. The communities decided to include an additional chapter in this plan so that their concerns, and their mitigation planning for these concerns, is represented in one location for reference and to guide actions throughout the plan's lifespan.

Hazardous Materials Incidents

Richland County is concerned about the possibility of hazardous materials incidents from:

- **Fixed Facility** - A facility containing hazardous substances when either accidental or intentionally released cause concern for life safety and environment containment.
- **Pipeline** - Accidental or intentional release of natural gas from the pipeline resulting in a potential evacuation or explosion.
- **Railway** - Train derailment, train/vehicle collision or intentional release causing ruptured rail cars to release hazardous substances resulting in life safety and environmental concerns.
- **Roadway** - Vehicle accident involving hazardous chemicals in transport on the roadway resulting in life safety and environmental concerns.

Physical Characteristics

Each Wisconsin County is designated as an emergency planning district and has a Local Emergency Planning Committee (LEPC) to administer the local hazardous chemical planning program under the Emergency Planning and Community Right-To-Know Act, also known as SARA Title III.

The Richland County LEPC membership includes local and state elected officials, members of emergency response agencies (EMS, fire, hazardous materials team, law enforcement, health, etc.), emergency management and hospitals along with representatives from transportation, broadcast and print media, community groups and Representatives of Facilities Subject to SARA Title III. LEPC member meet regularly in the community.

At Richland County LEPC meetings, members representing emergency responders, industry and the community actively participate in the emergency planning process for chemicals present on-site at facilities, exchanging ideas and information that contribute to effective, safe emergency planning for accidental chemical releases.

The Emergency Management Deputy Director updates each plan every year and creates new plans for new reporting facilities. After the plan is created it is review by the Richland County LEPC Off-site Committee. The plan addresses chemicals stored on site, storage practices and safety, chemical protection and monitoring systems, facility on-site emergency procedures and available facility emergency equipment. Vulnerability zones are created describing the worst case scenario for a chemical release. Specifically, ensuring to the extent possible the safety of emergency responders, employees and the community are a priority during this review process.

Frequency of Occurrence

Good communication and preparedness (i.e., planning, training and exercising) measures between the stakeholders in the hazardous materials field help to ensure that hazardous materials events are not common but these incidents can and do occur. In general, Richland County has a medium likelihood of an hazardous

materials incident from any mode with a medium to high risk of damage, death or injury (based on the type of incident, the type and amount of chemical and other incident-variable factors) due if an incident does occur.

Vulnerability

Hazardous materials incidents can impact much of the county because it is crossed by roadways, pipelines and railway corridors that run through residential, agricultural and commercial neighborhoods. Fixed facilities, while concentrated in business areas, can also be found in residential and agricultural areas. The spill of a hazardous material can impact human life as well as environmental life (e.g., plants, animals, insects) and the environmental components (e.g., soils, water) that come into contact with the material. The material may also contaminate structures (e.g., buildings roads) and require a high level of community response and recovery, and the costs associated with them, to rectify the situation.

Hazard Mitigation Strategies

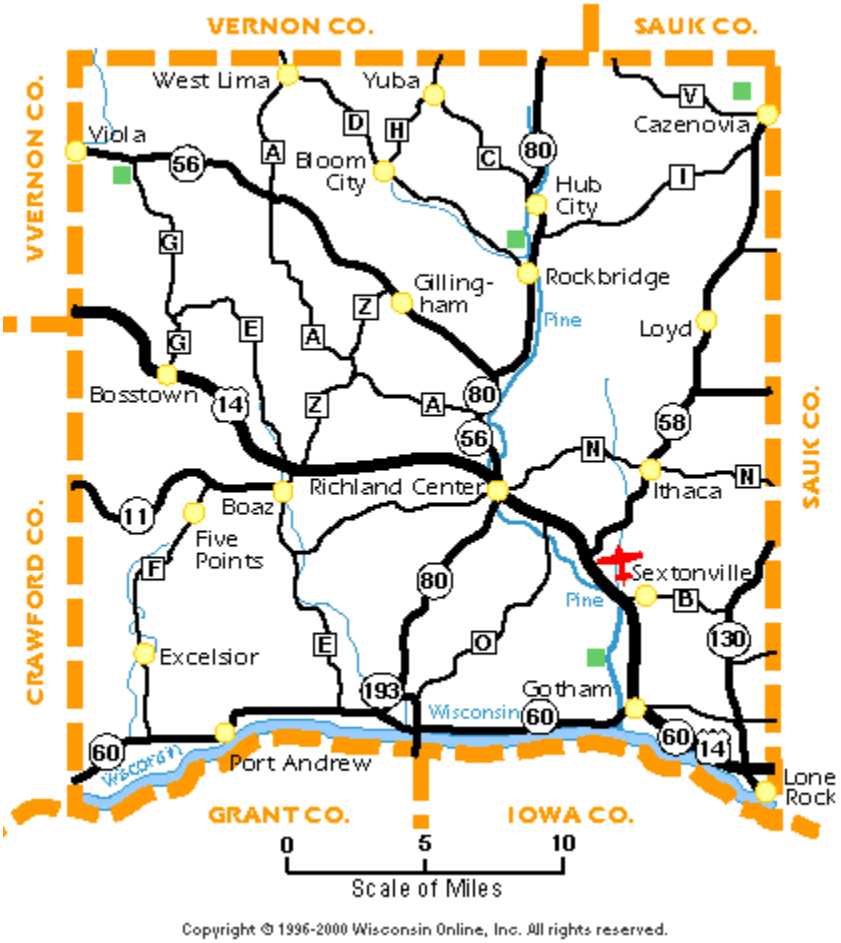
The goal of hazardous materials incident mitigation activities is to reduce, in a cost effective manner, the loss of lives and property and to reduce environmental damage due to these incidents. Hazard mitigation strategies include updating the LEPC off-site

plans to ensure thoroughness and currency and continuing annual training programs for all of the county's first response agencies on hazardous materials topics including training first responders on proper methods and techniques of minimizing impacts to people and property when a hazardous material is released. All of these efforts are part of an annual ongoing and expanding effort to protect people and property from non-natural (i.e., man-made or technological) hazards.

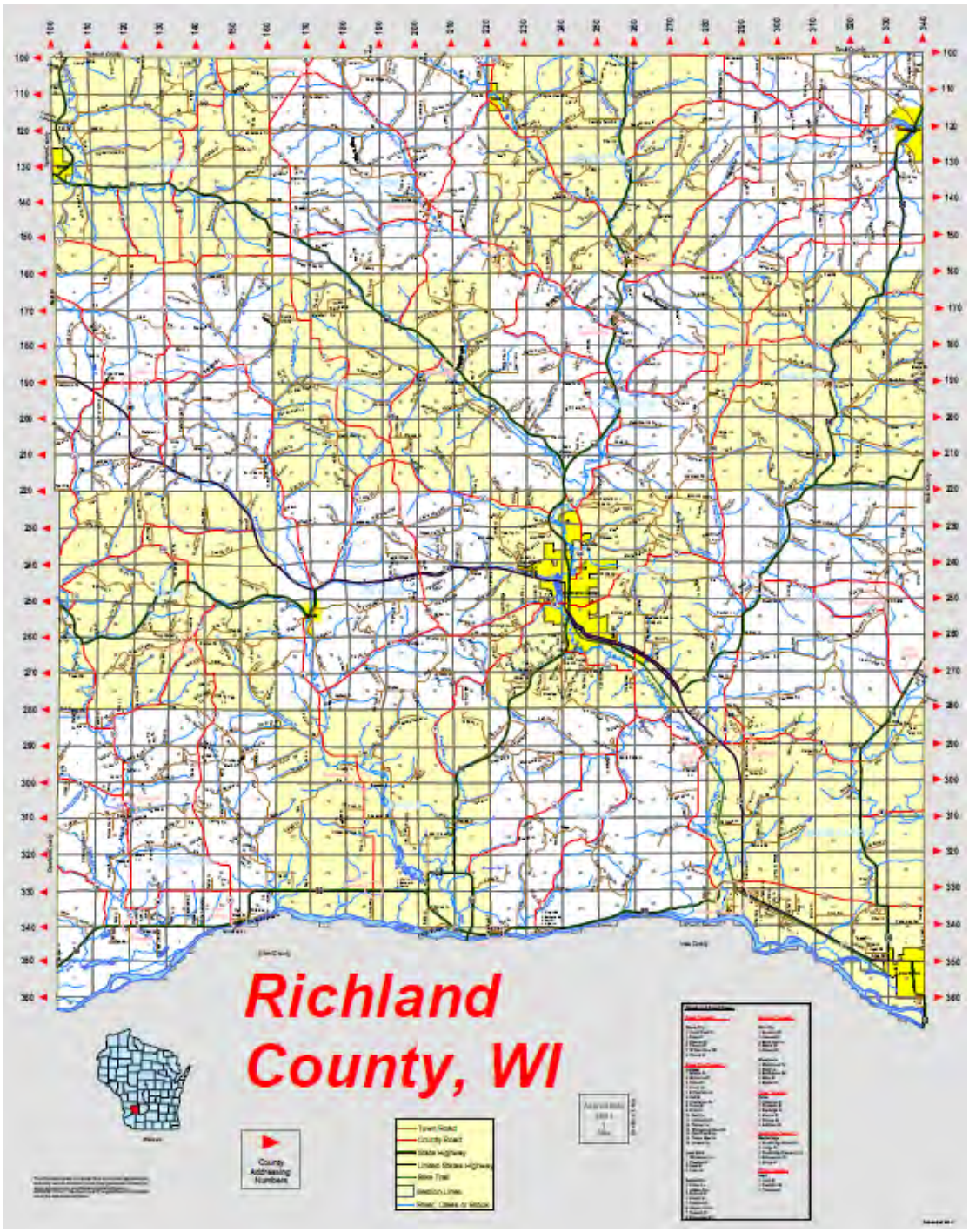
Appendix A: Maps

Richland County Base Map

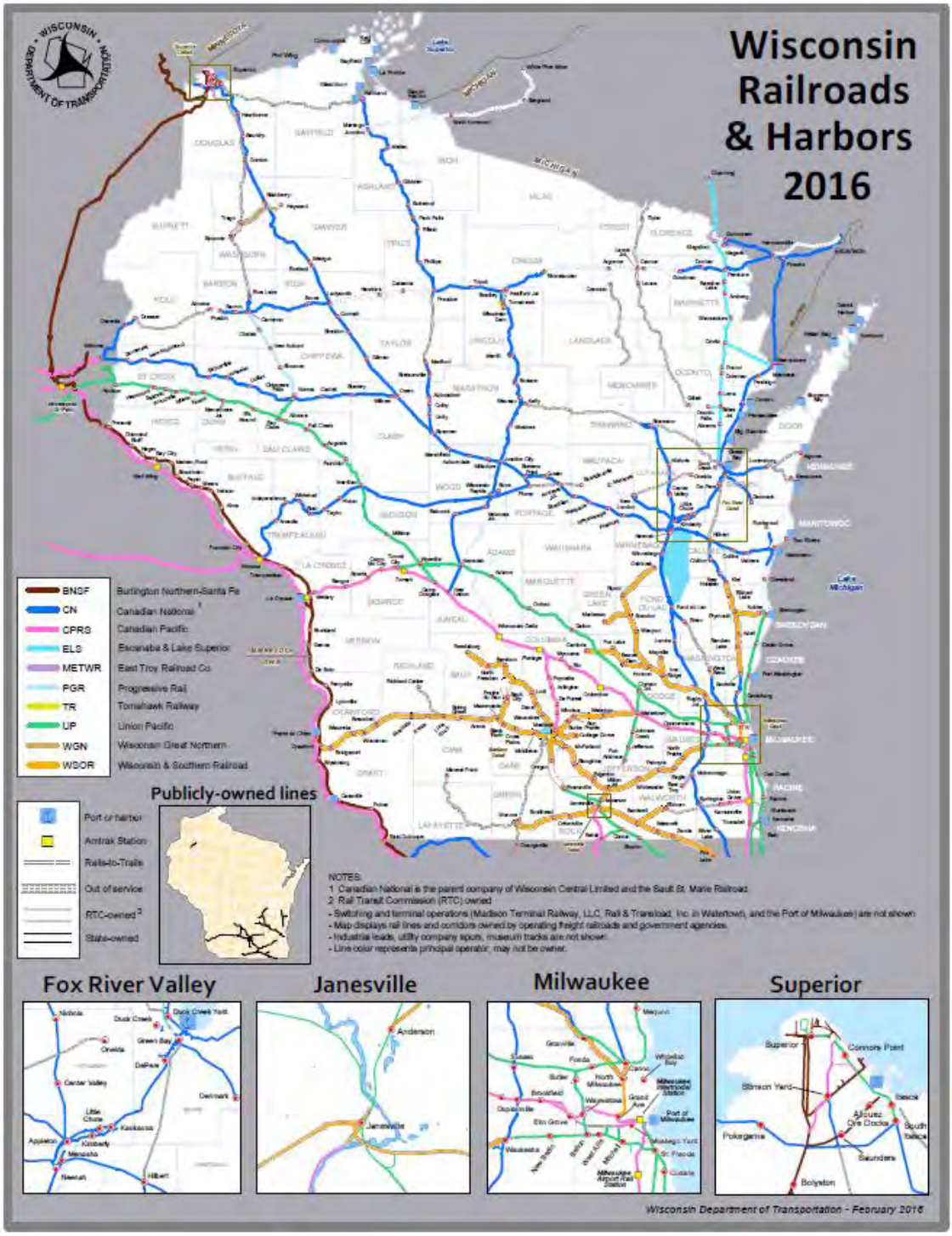
Map of Richland County, Wisconsin



Richland County Master Highway Map

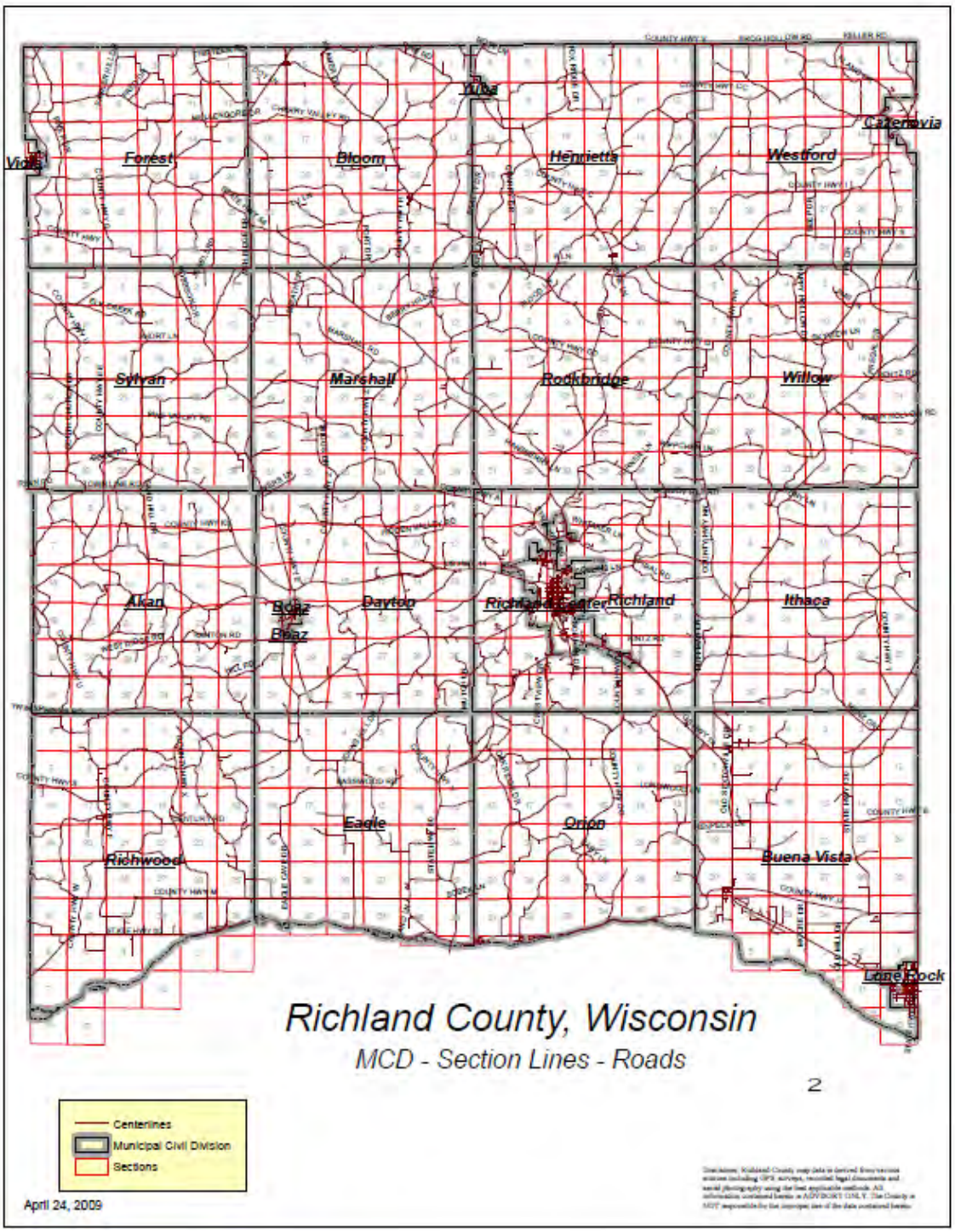


Wisconsin Railroads and Harbors[108]

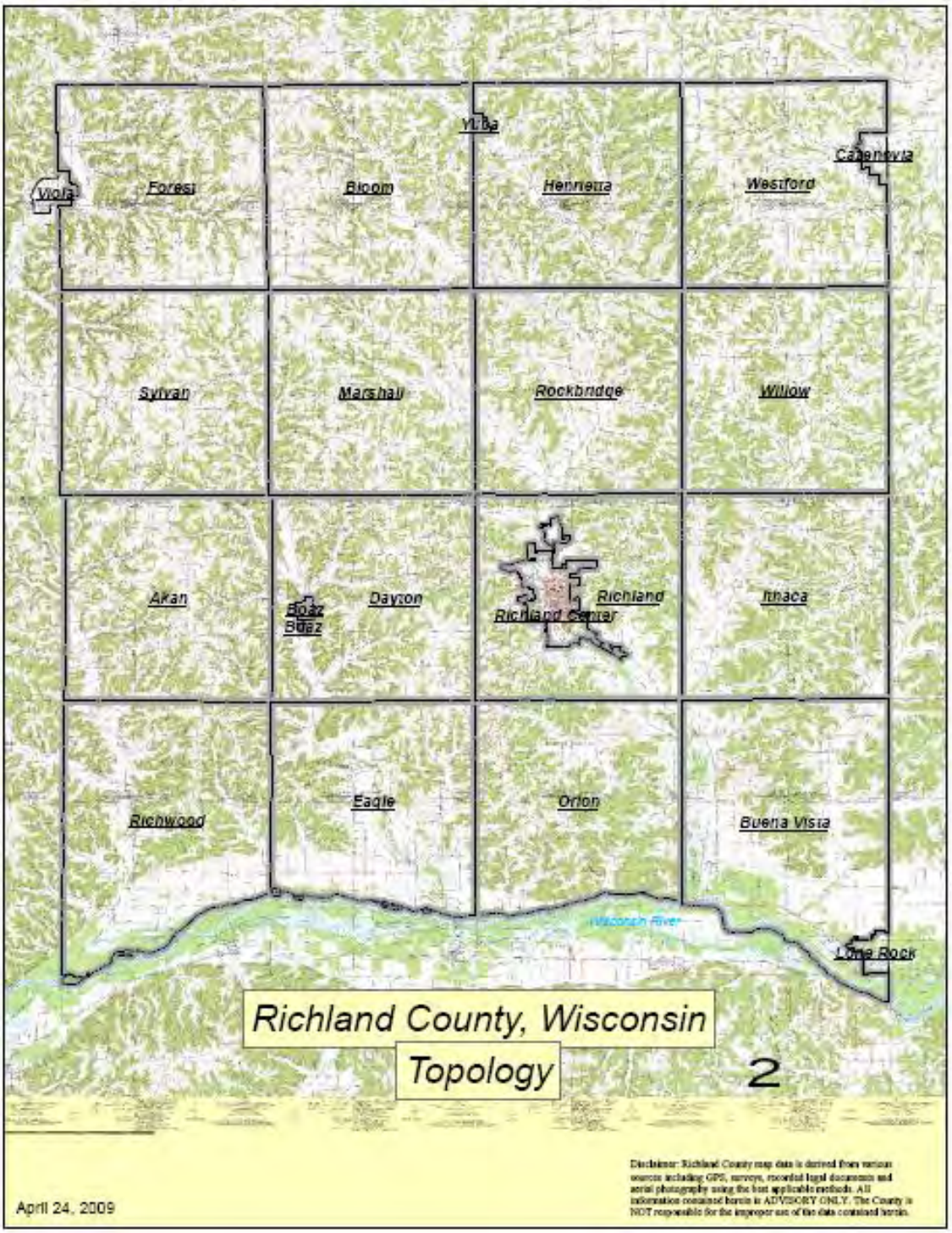


[108] http://wisconsindot.gov/Documents/travel/rail/railmap.pdf

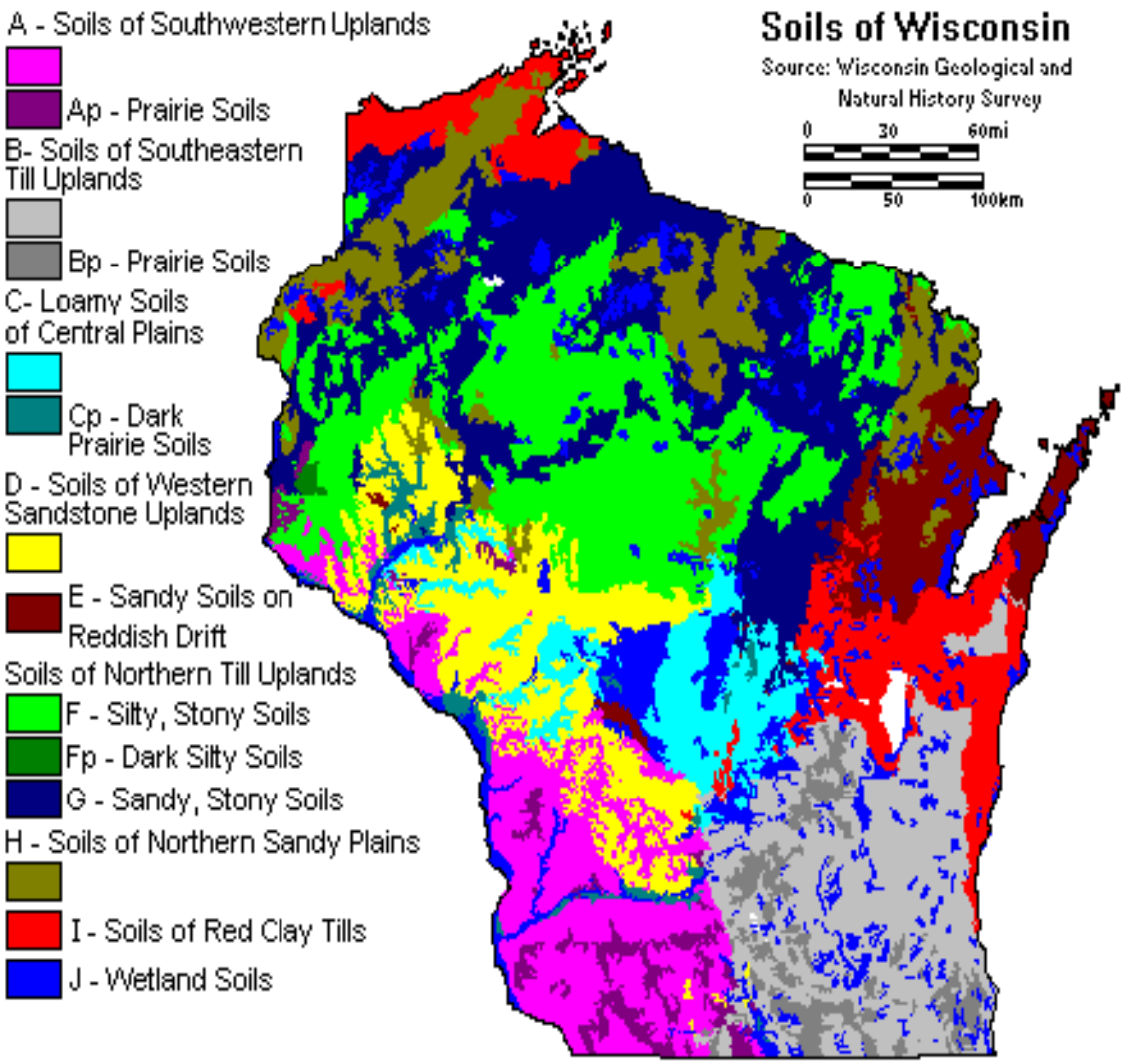
Richland County Civil Divisions Map



Richland County Topology Map

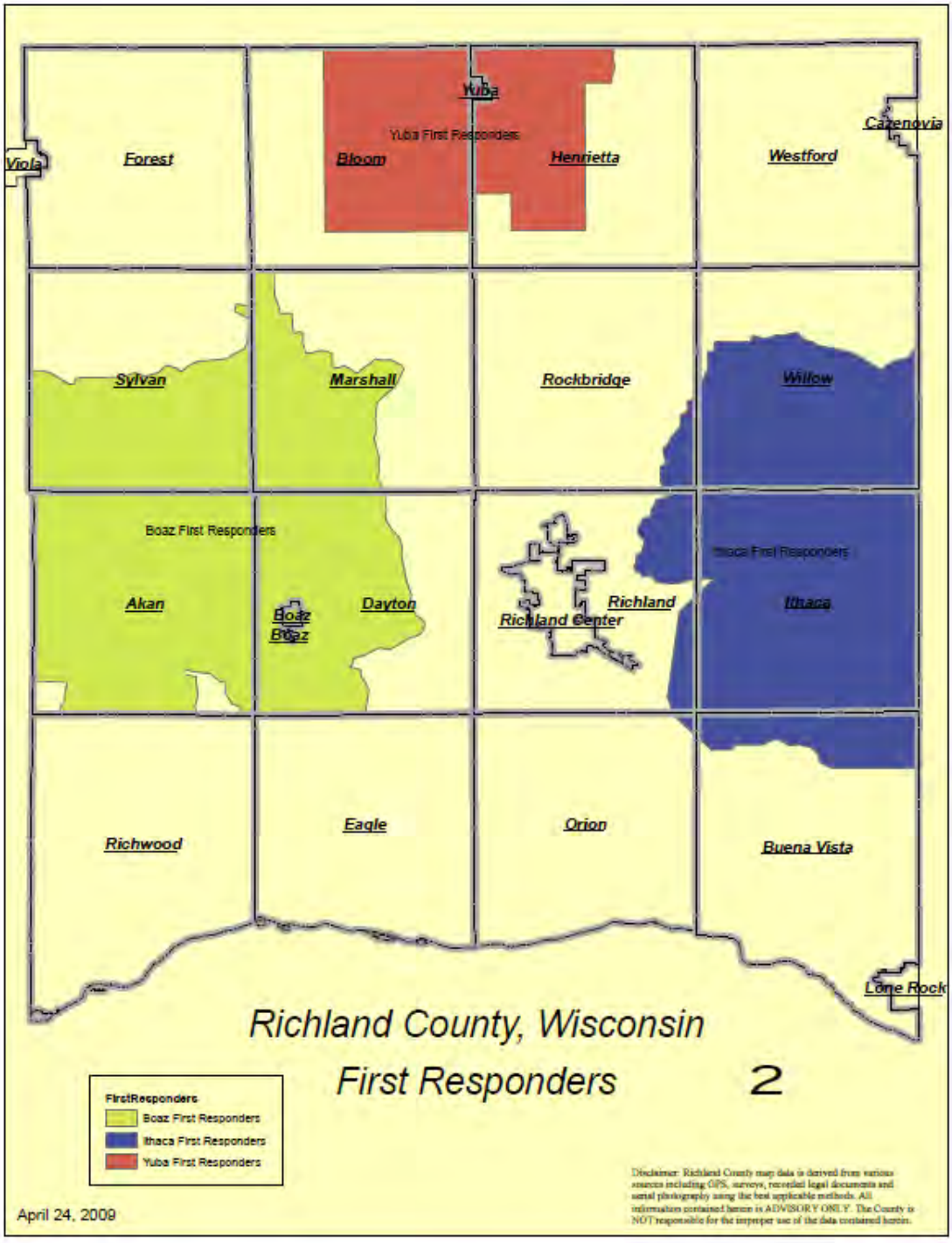


Soils Types[109]

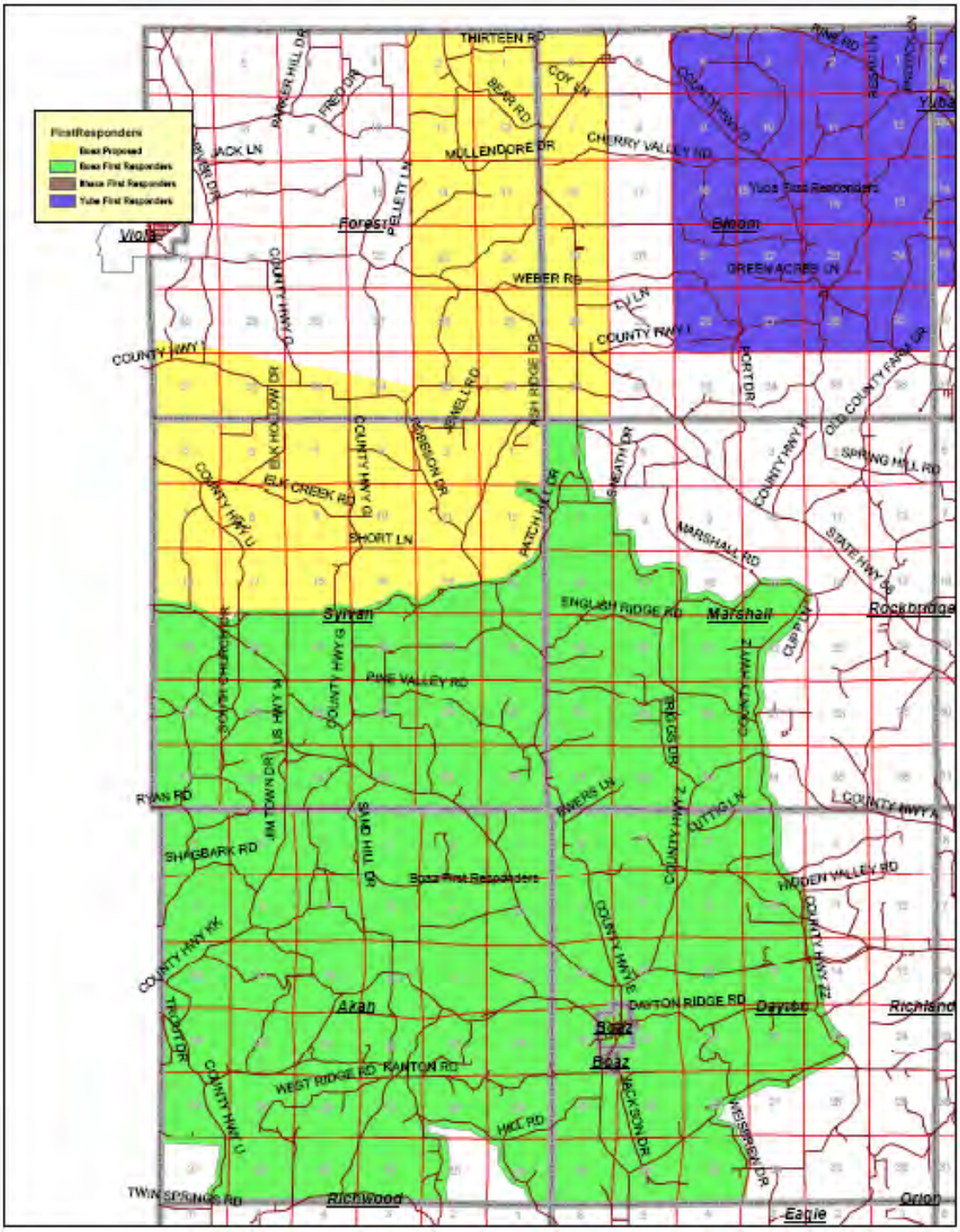


[109] Source: *Soils of Wisconsin* compiled by F. D. Hole, 1973; Wisconsin Geological and Natural History Survey Map, scale (approx.) 1: 3,150,000.

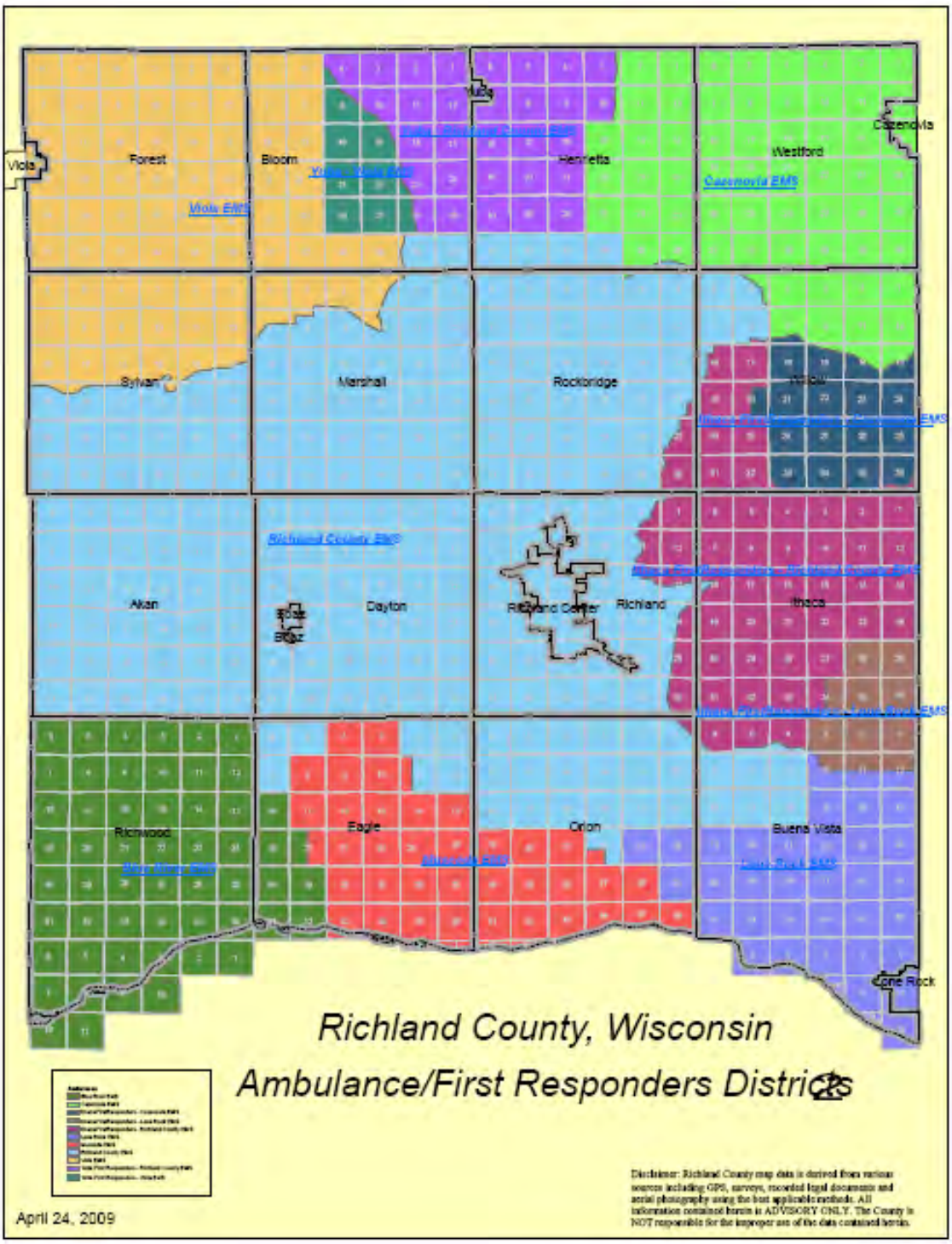
Richland County First Responders



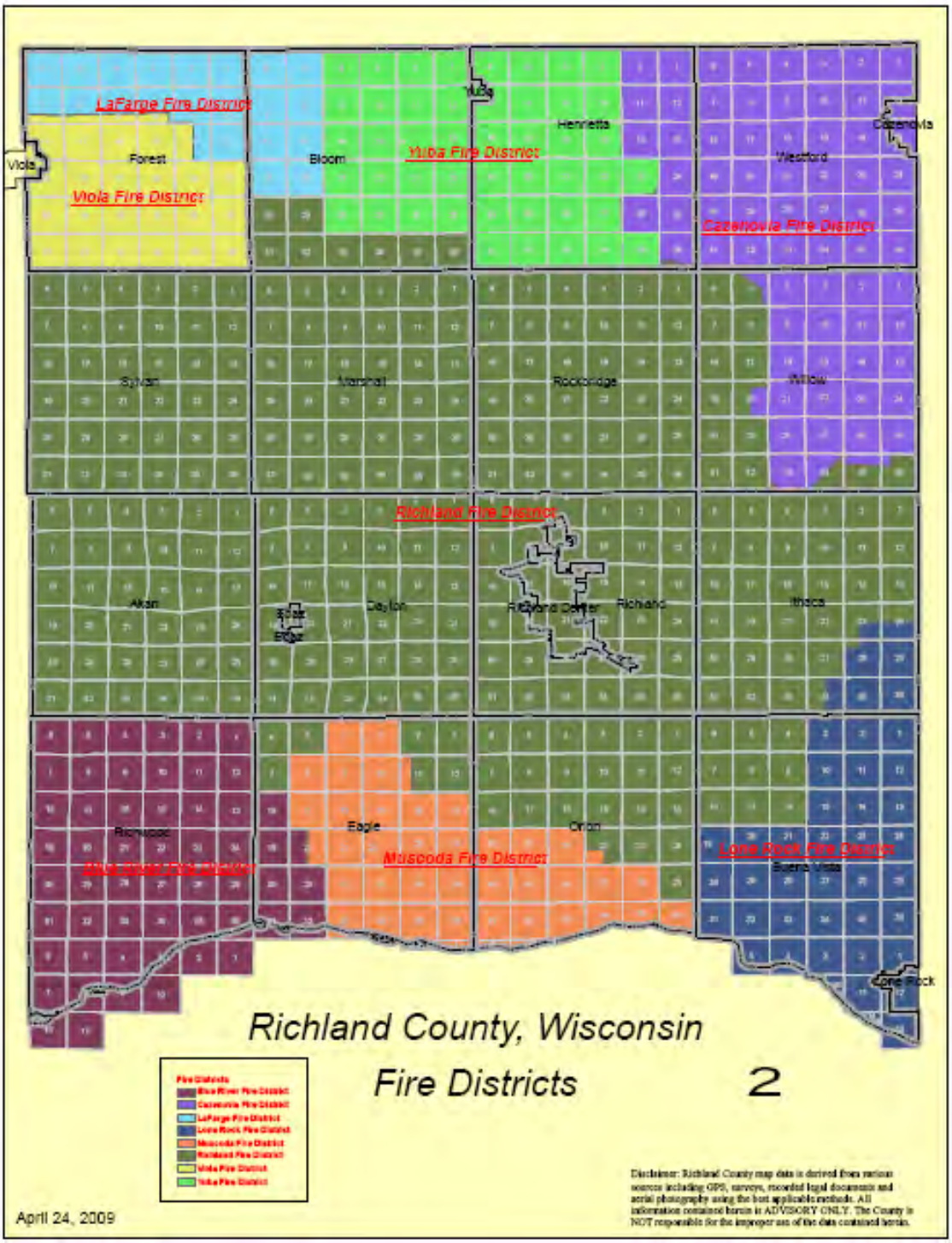
Boaz First Responder District



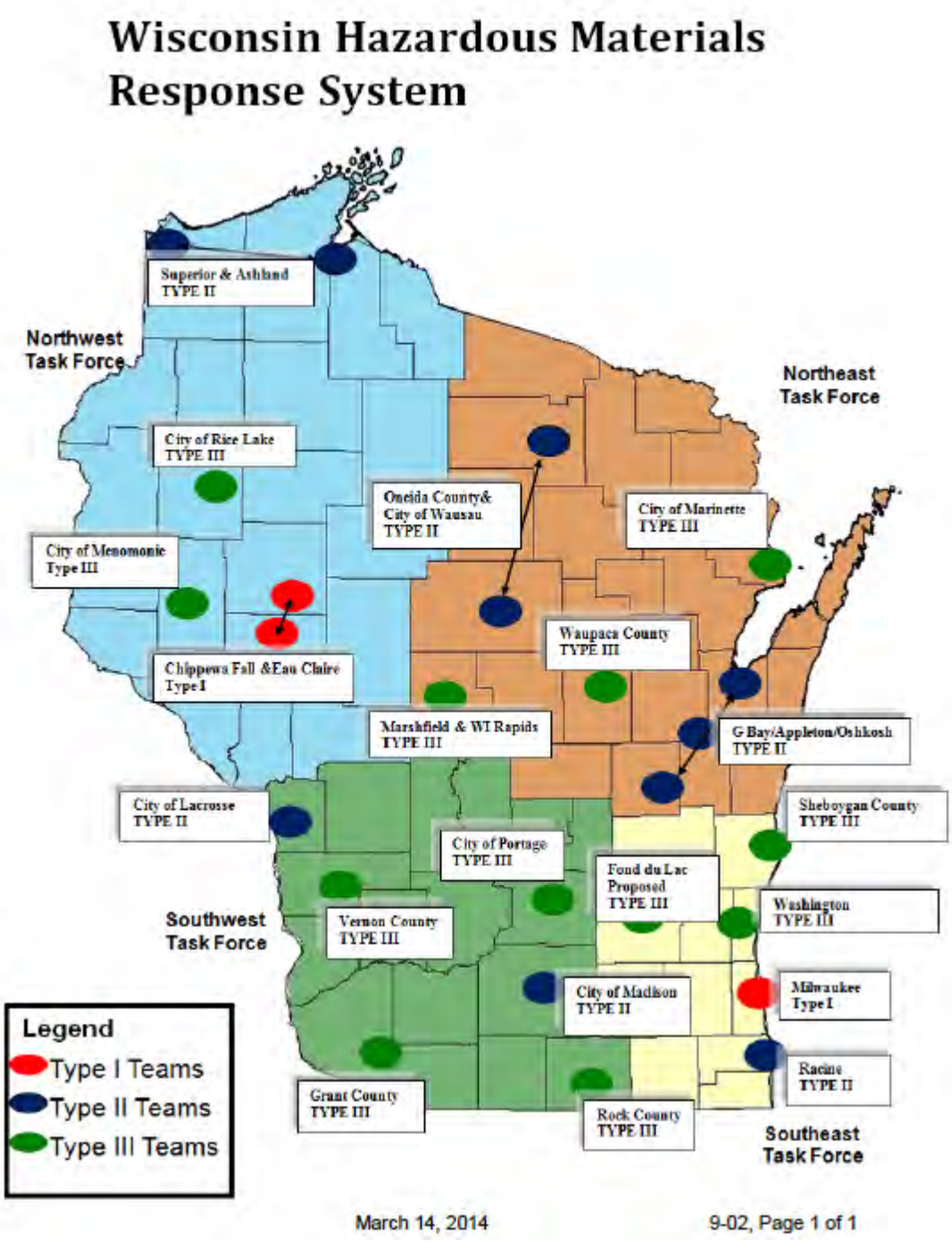
Richland County Ambulance Districts



Richland County Fire Districts

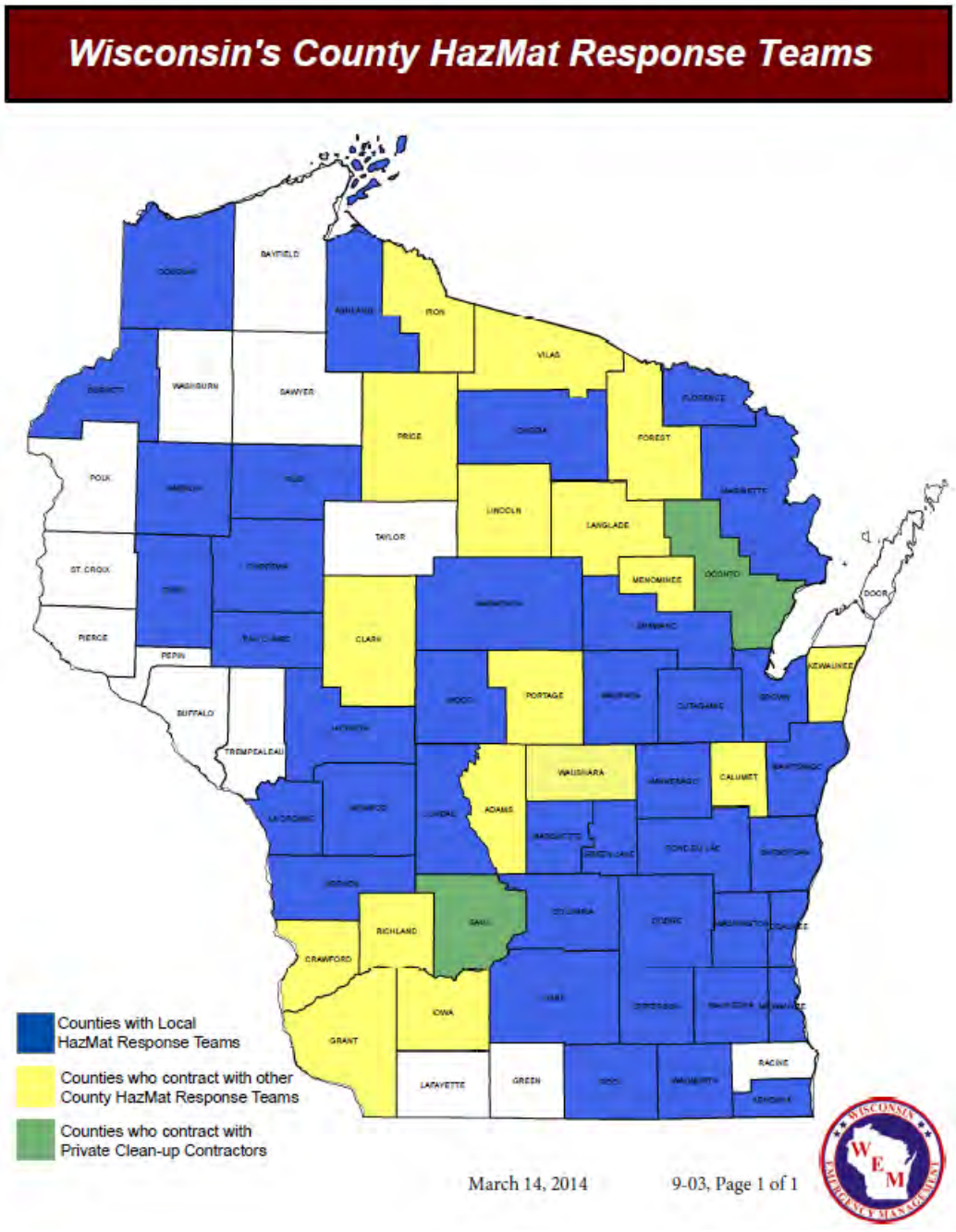


Wisconsin Hazardous Materials Response System[110]



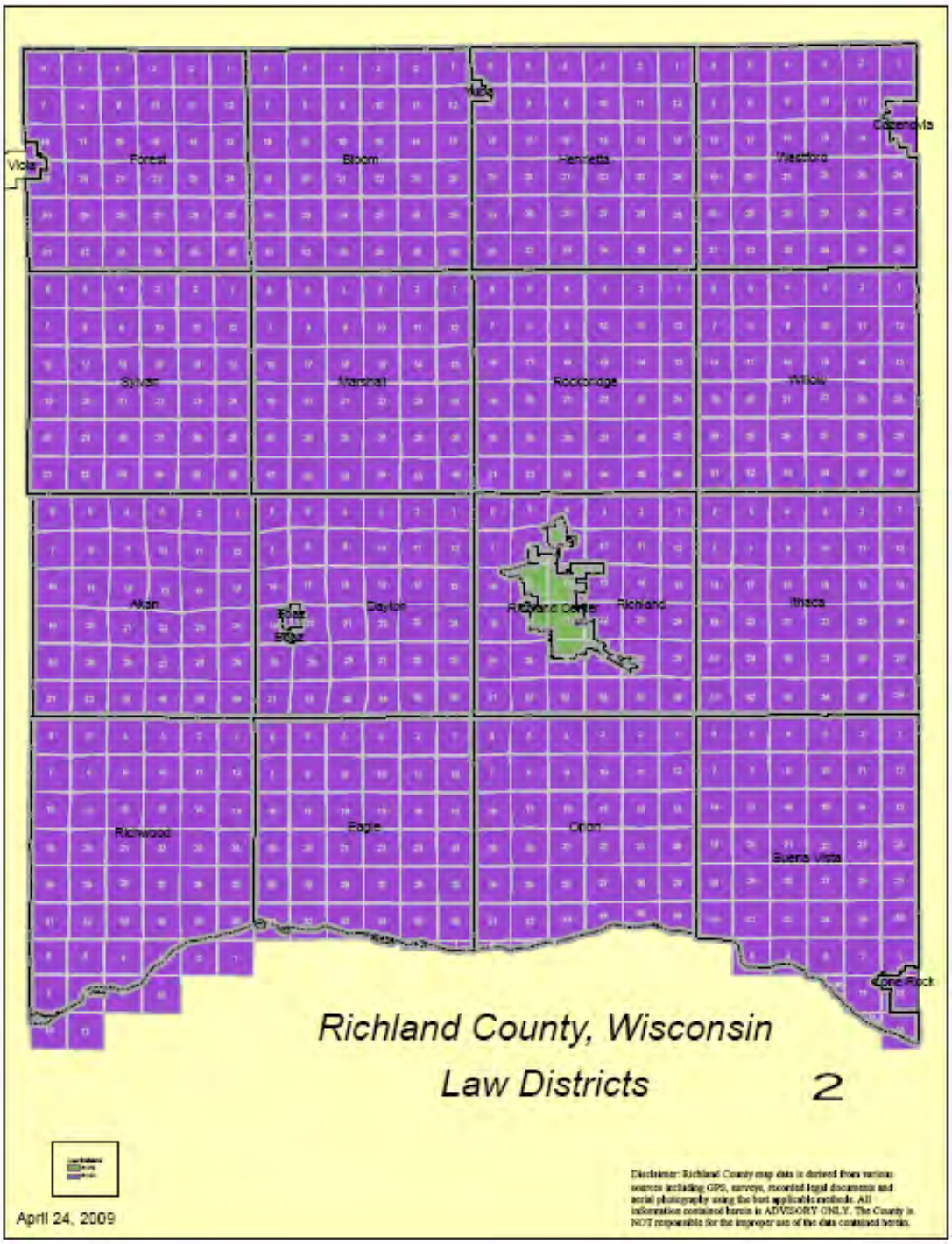
[110] Wisconsin Emergency Management

Wisconsin Hazardous Materials Response System[111]



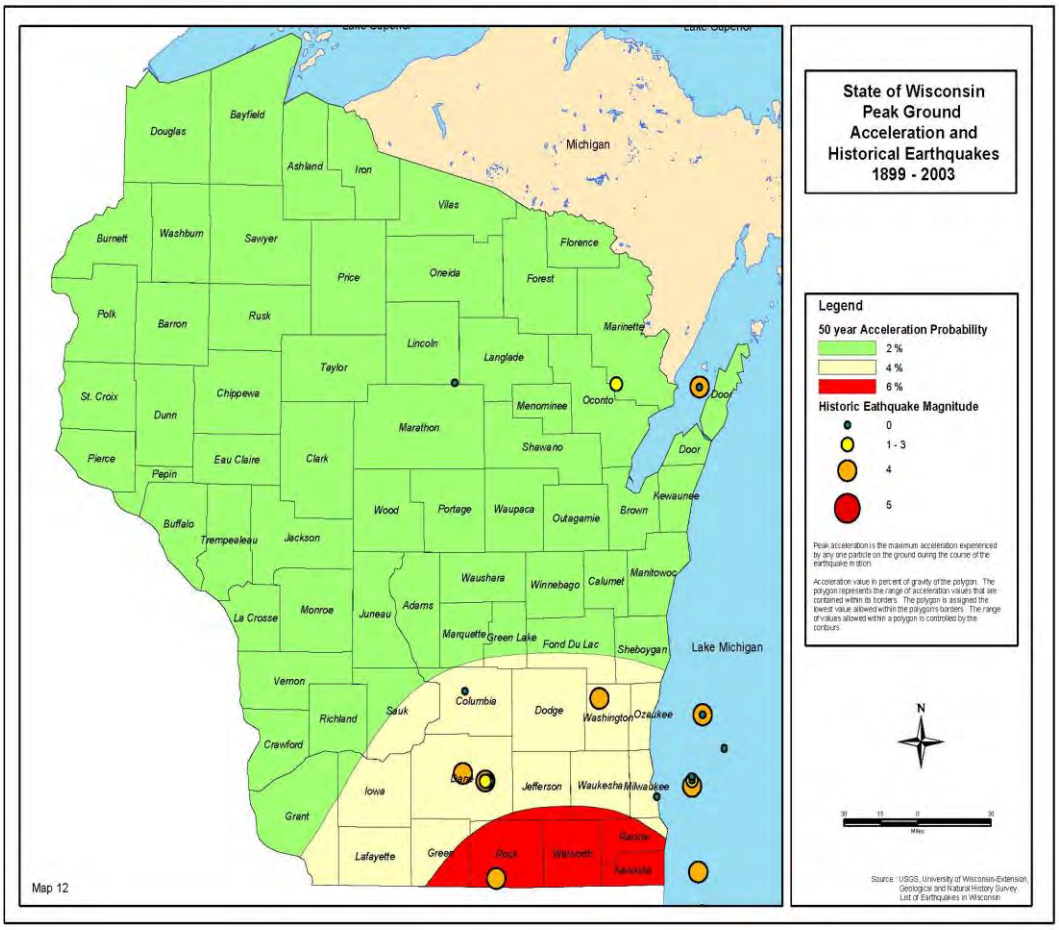
[111] Wisconsin Emergency Management

Richland County Law Enforcement Districts

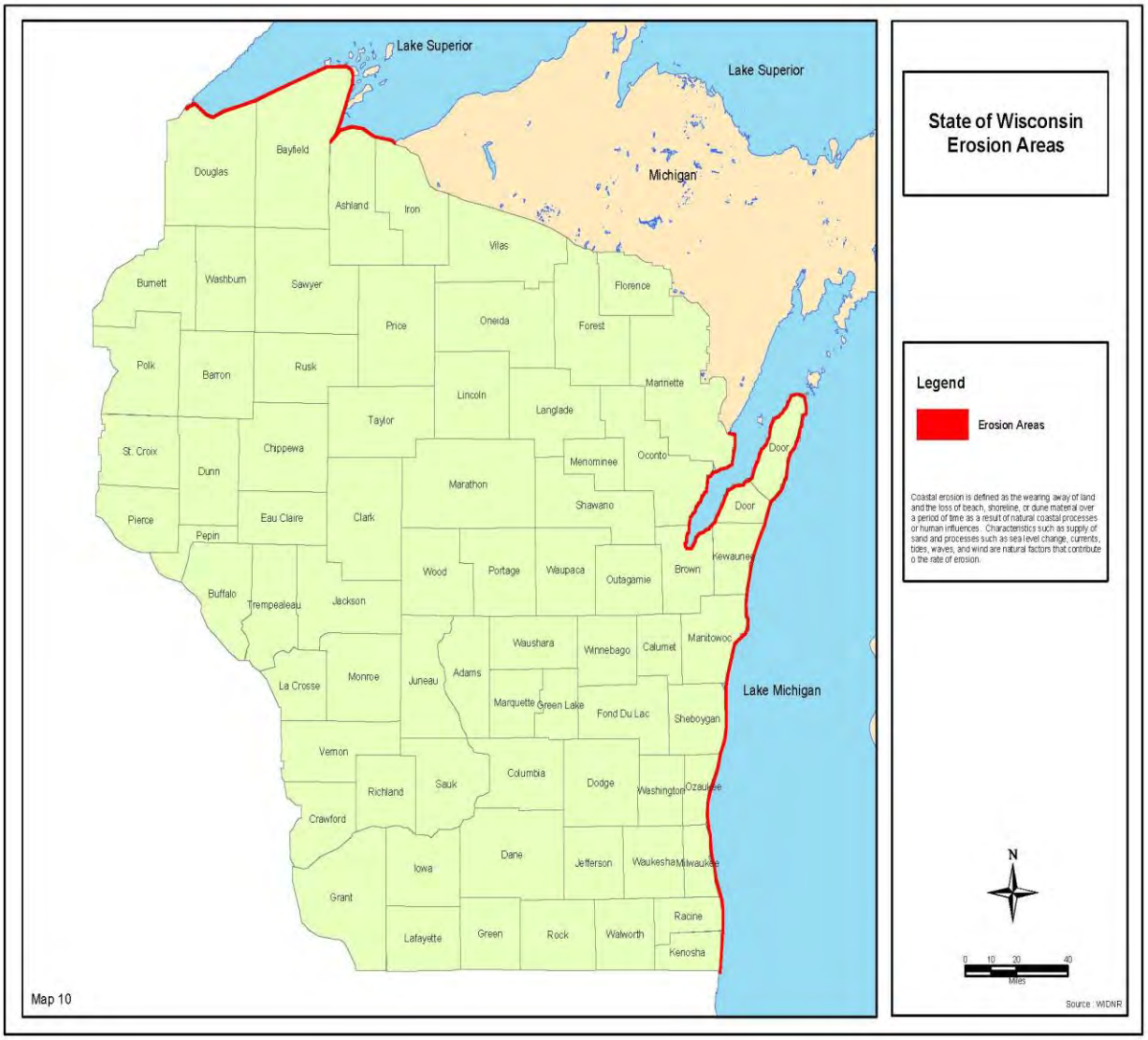


Earthquakes in Wisconsin[112]

Peak Ground Acceleration Contours and Historical Earthquakes in Wisconsin



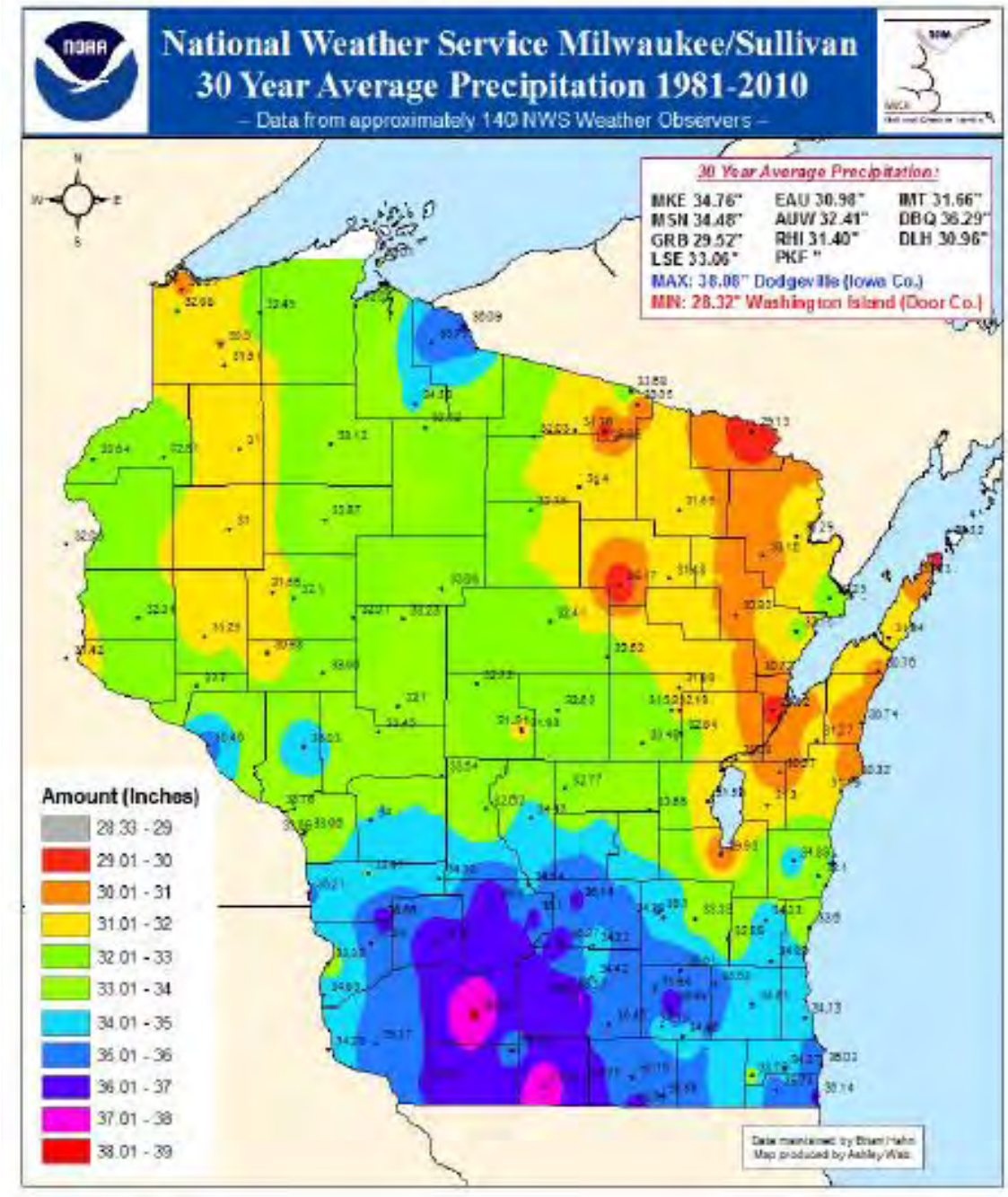
[112] Wisconsin State Hazard Mitigation Plan



Erosion Areas in Wisconsin[113]

[113] Wisconsin State Hazard Mitigation Plan

Wisconsin 30 Year Average Precipitation 1981-2010 [114]

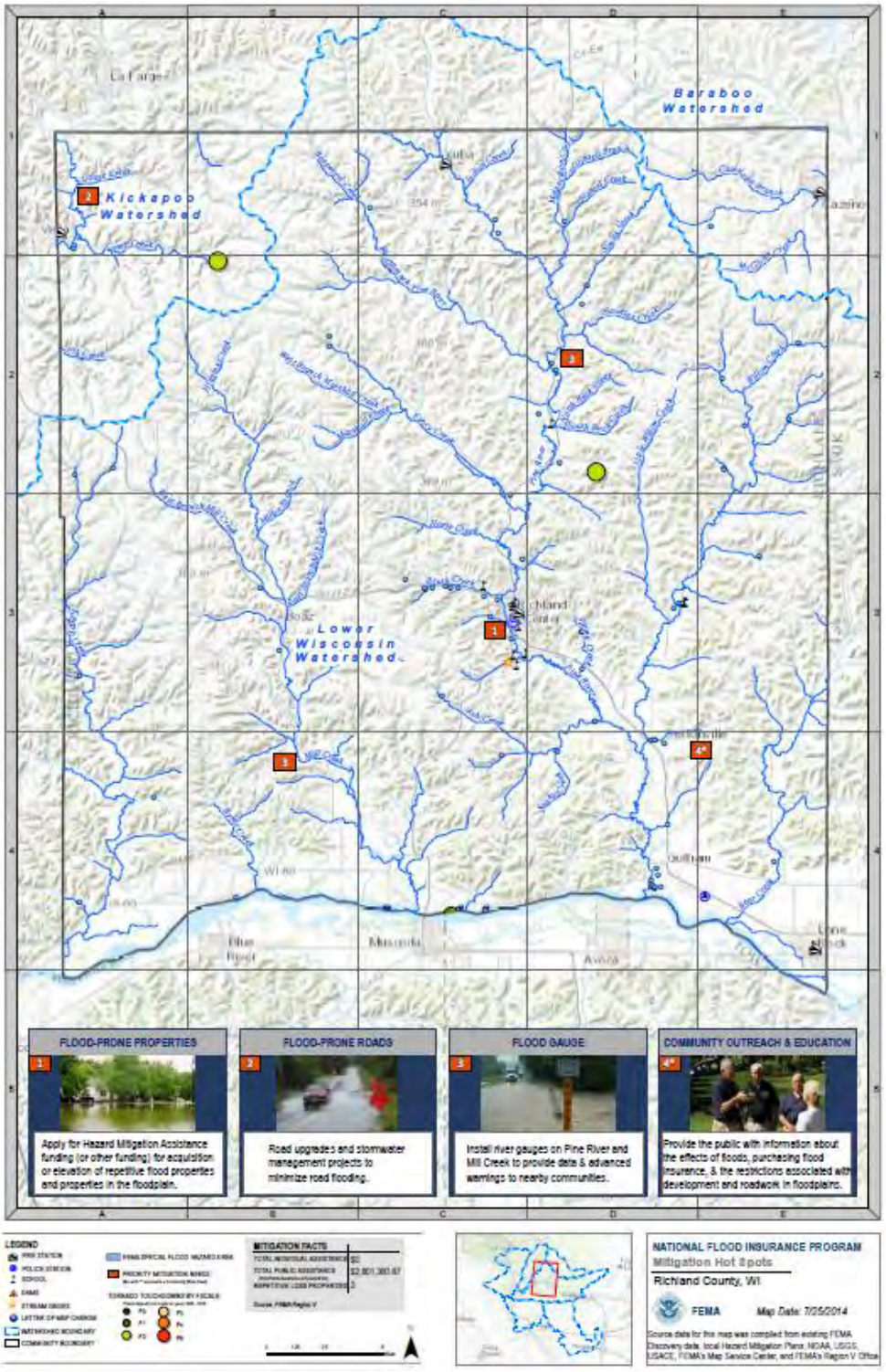


[114] Source: http://www.weather.gov/images/mkx/climate/avg_30_year_precip.png

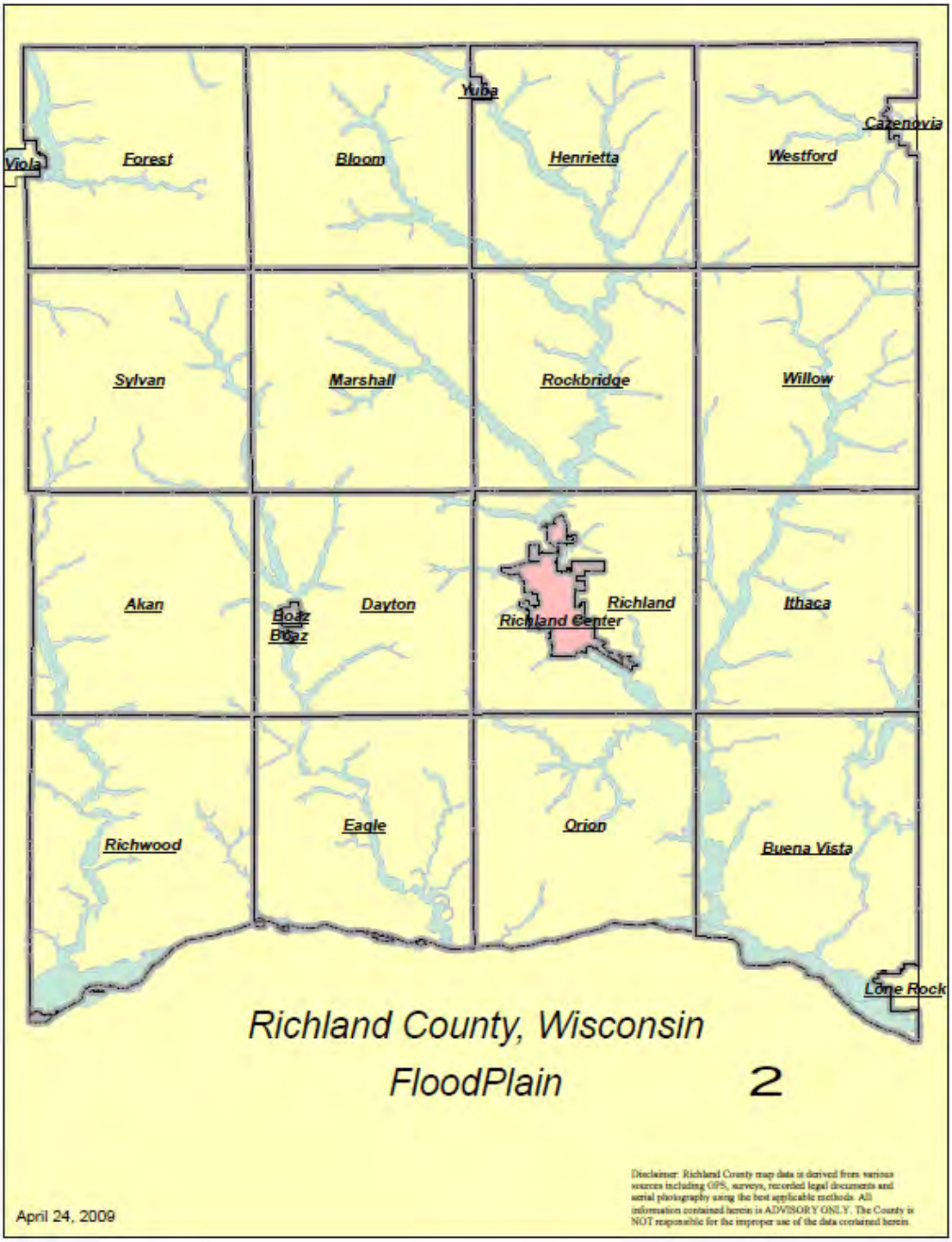
Wisconsin Total Flood Events[115]

[115] Source: http://www.weather.gov/images/mkx/svr-wx-stats/Flood.jpg

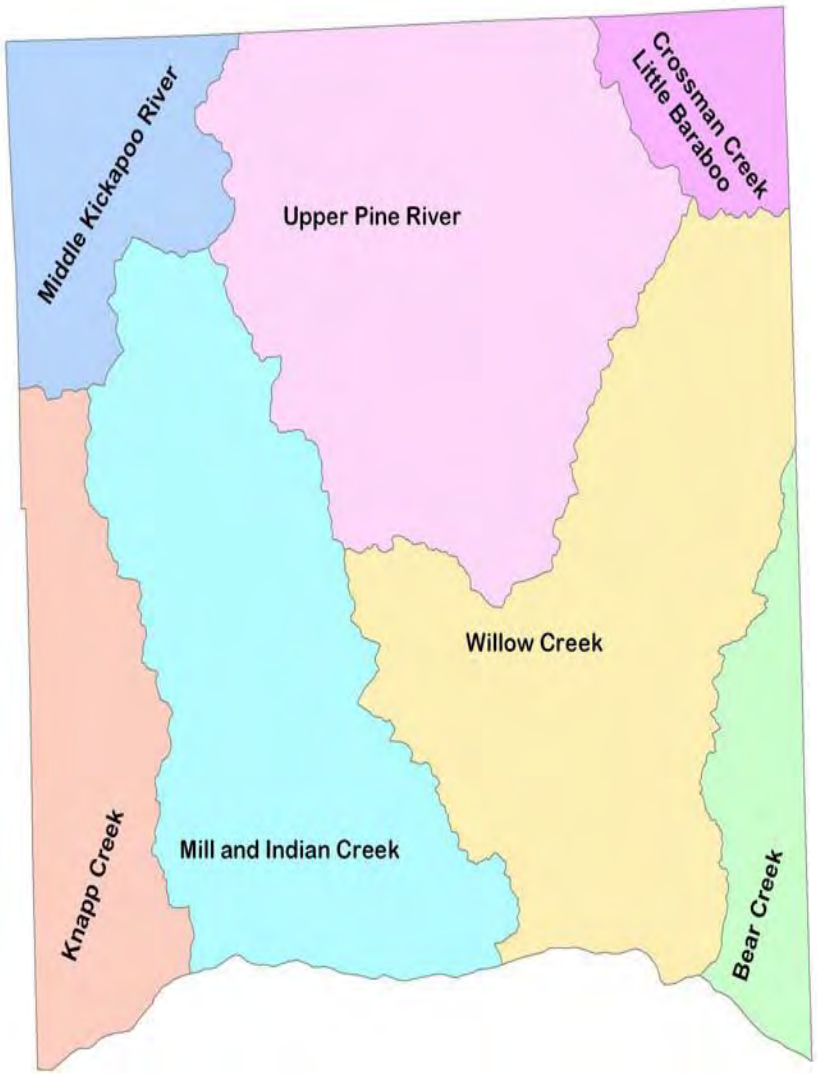
Richland County Mitigation Hot Spots



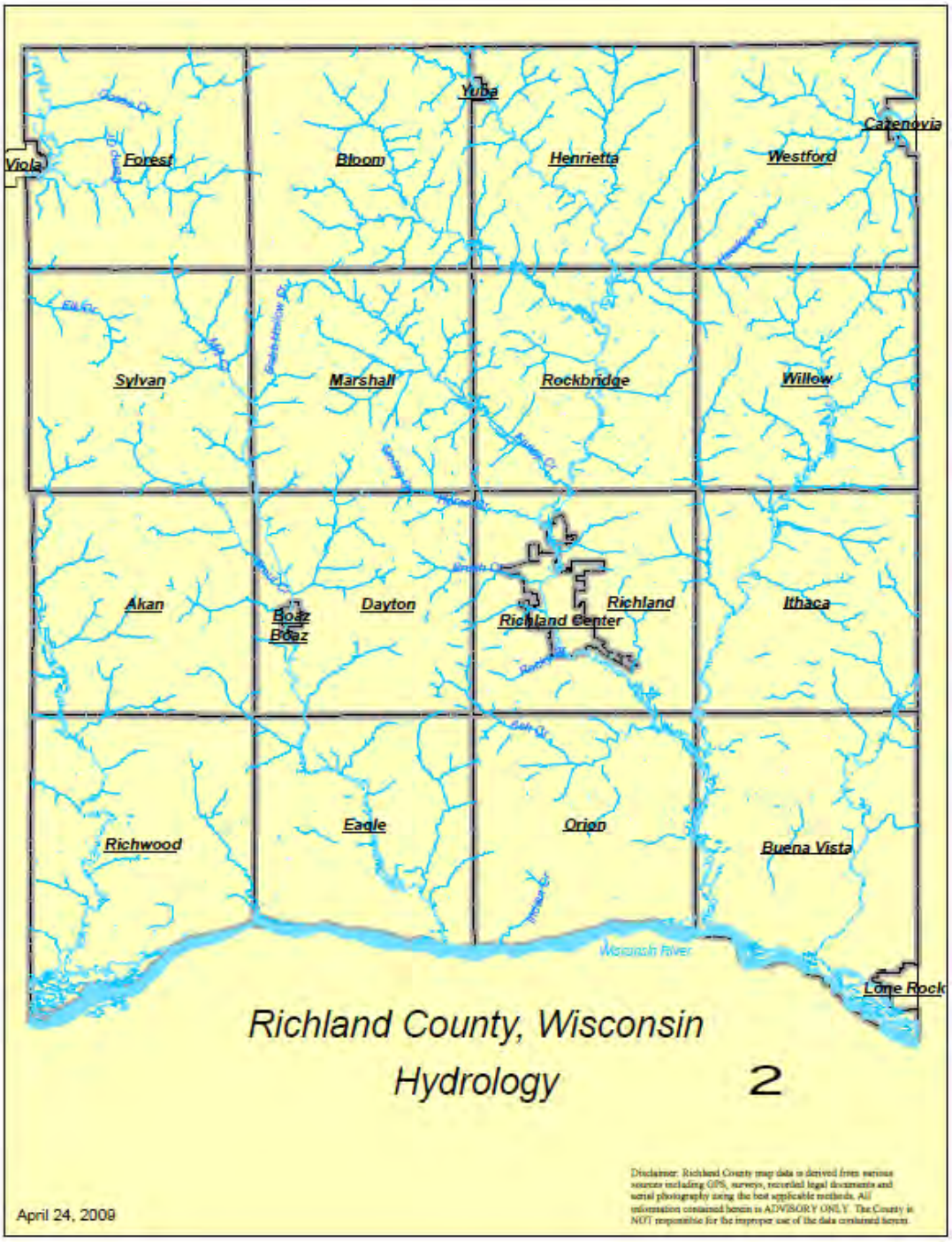
Richland County Floodplain



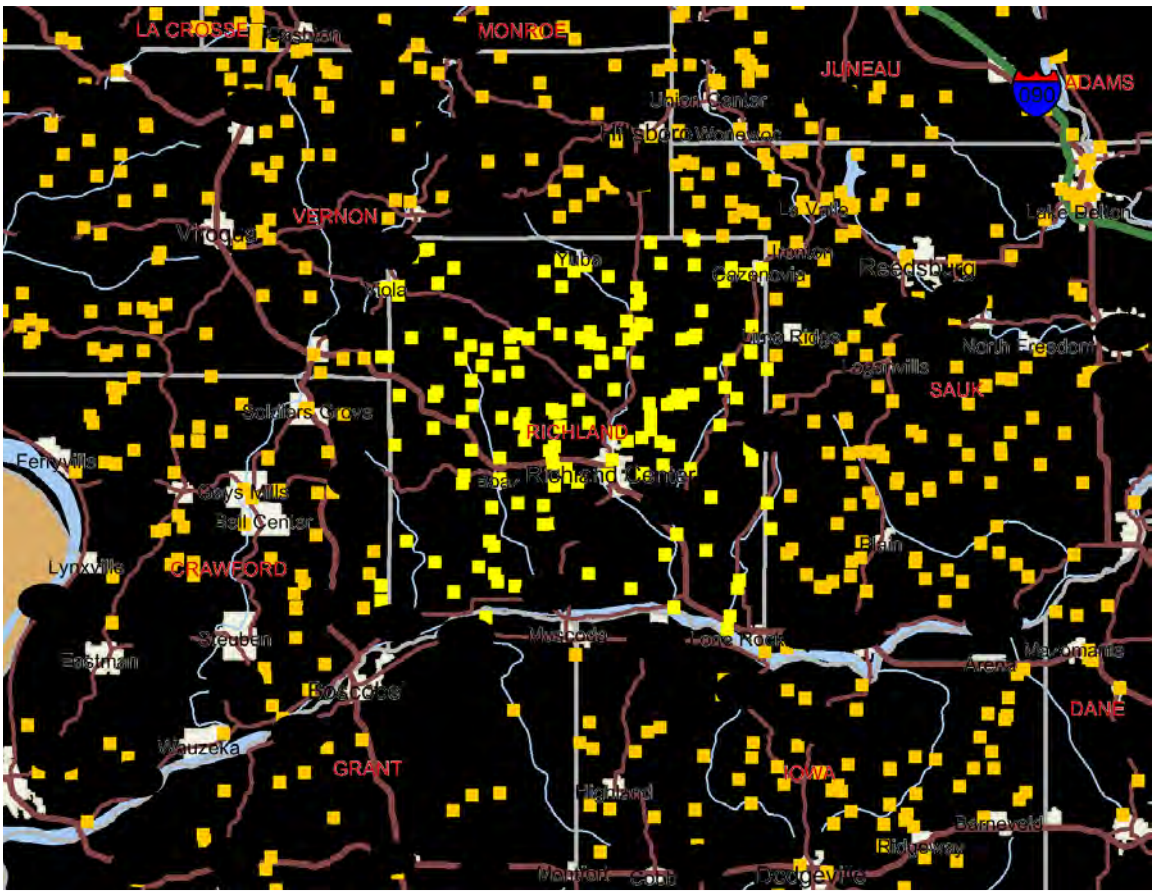
Richland County Watersheds



Richland County Hydrology

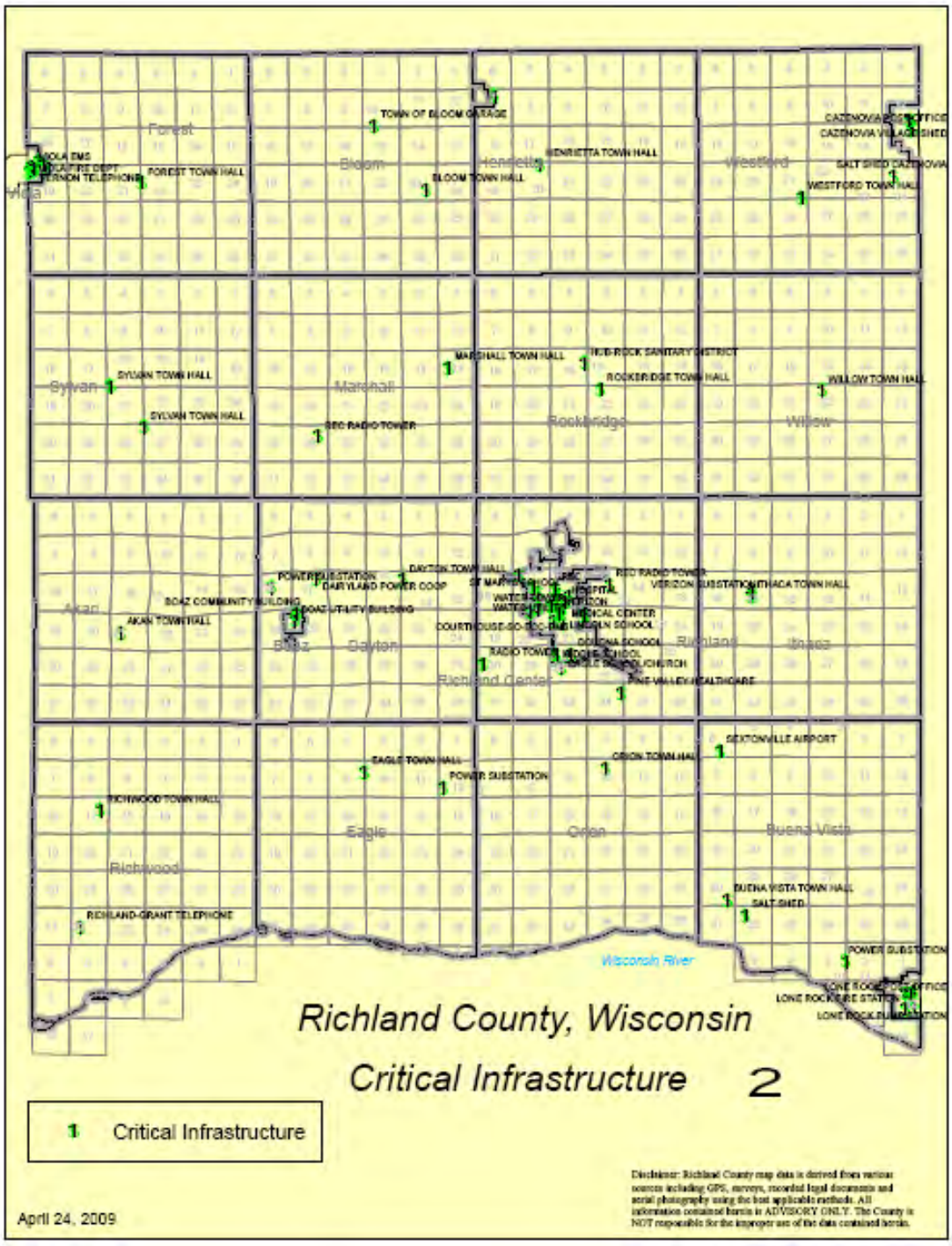


Richland County Dams[116]



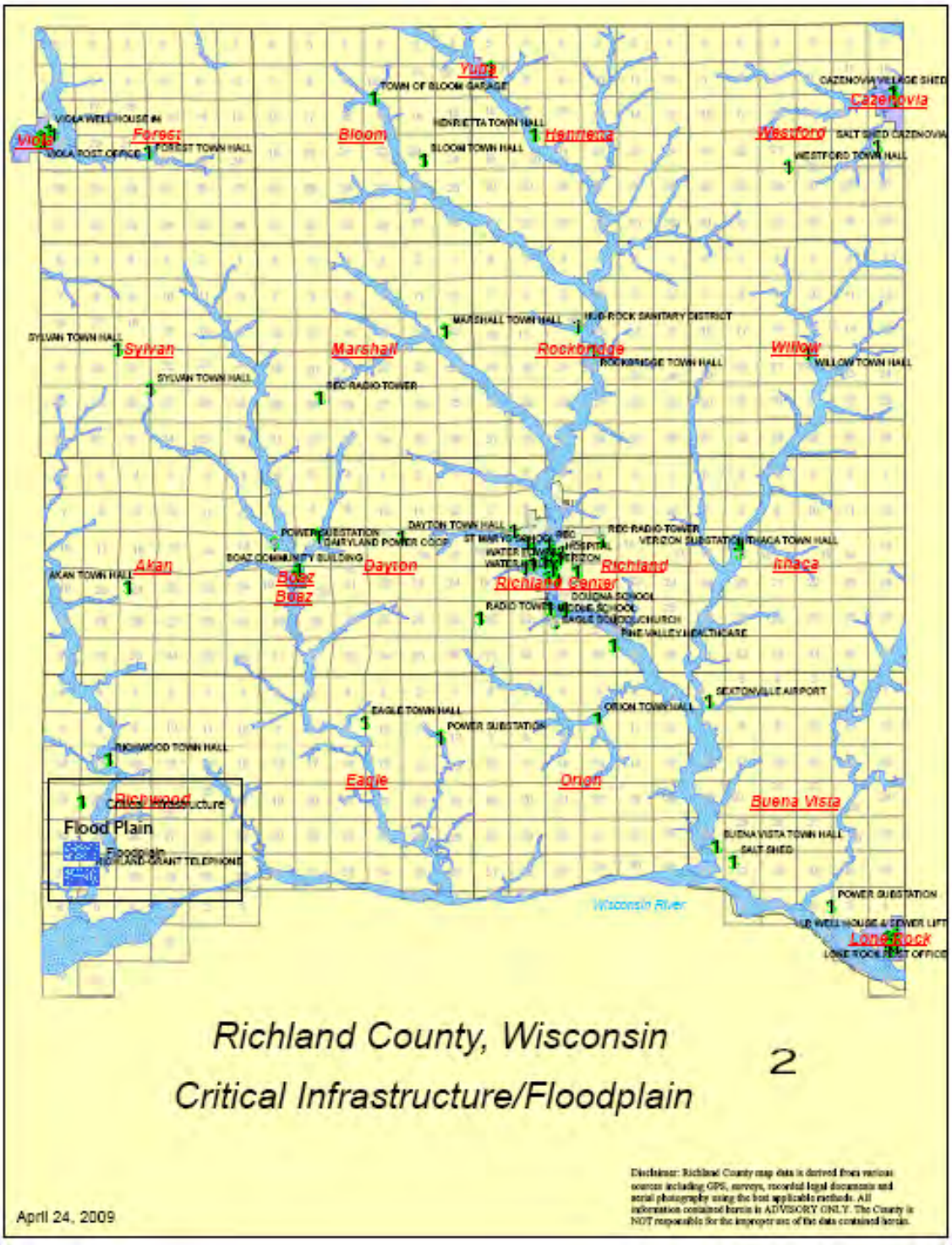
[116] http://dnrmaps.wisconsin.gov/imf/imf.jsp?site=SurfaceWaterViewer

Richland County Critical Infrastructure[117]

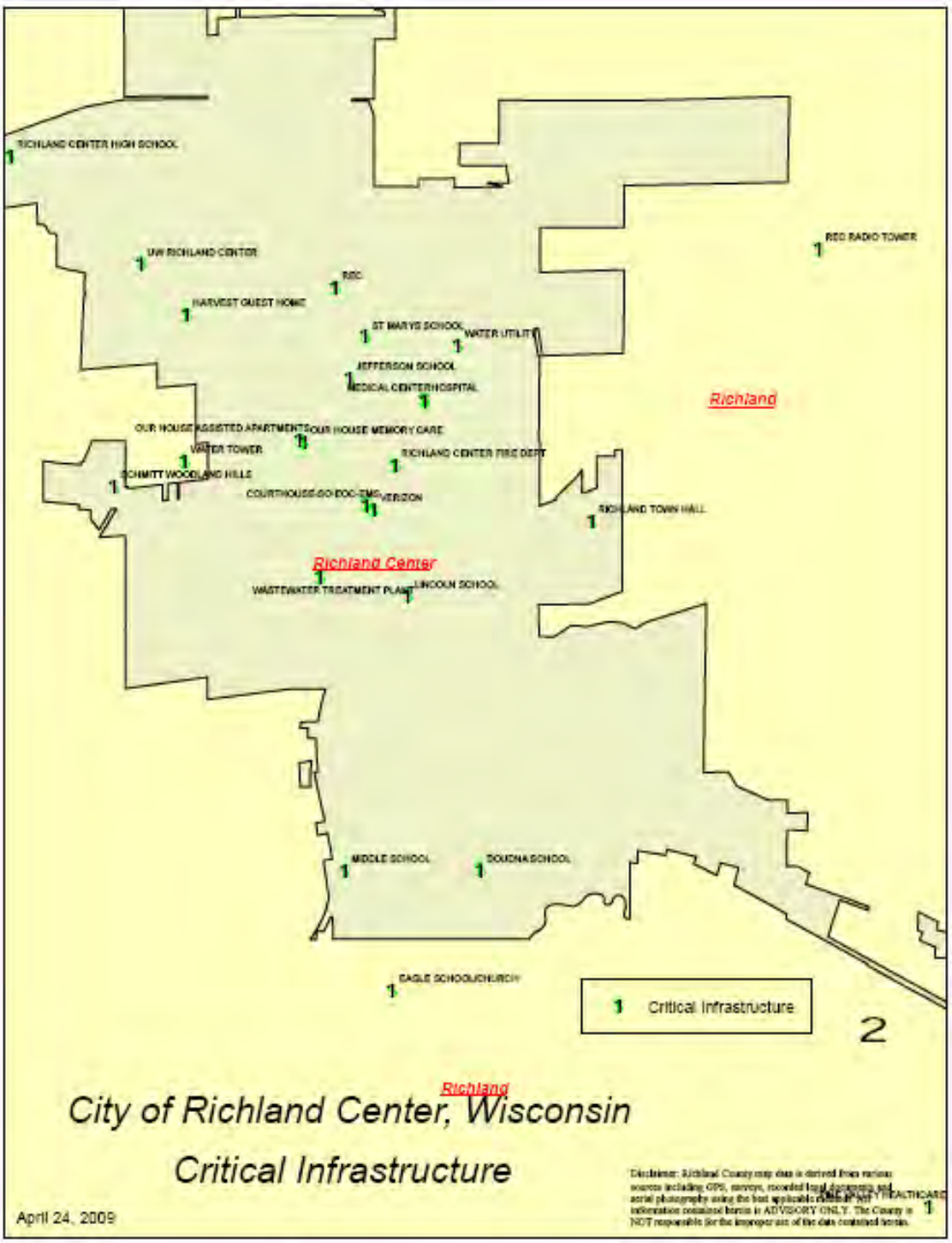


[117] Note that the Richland Center Infrastructure maps follow to show additional detail.

Richland County Critical Infrastructure in the Floodplain

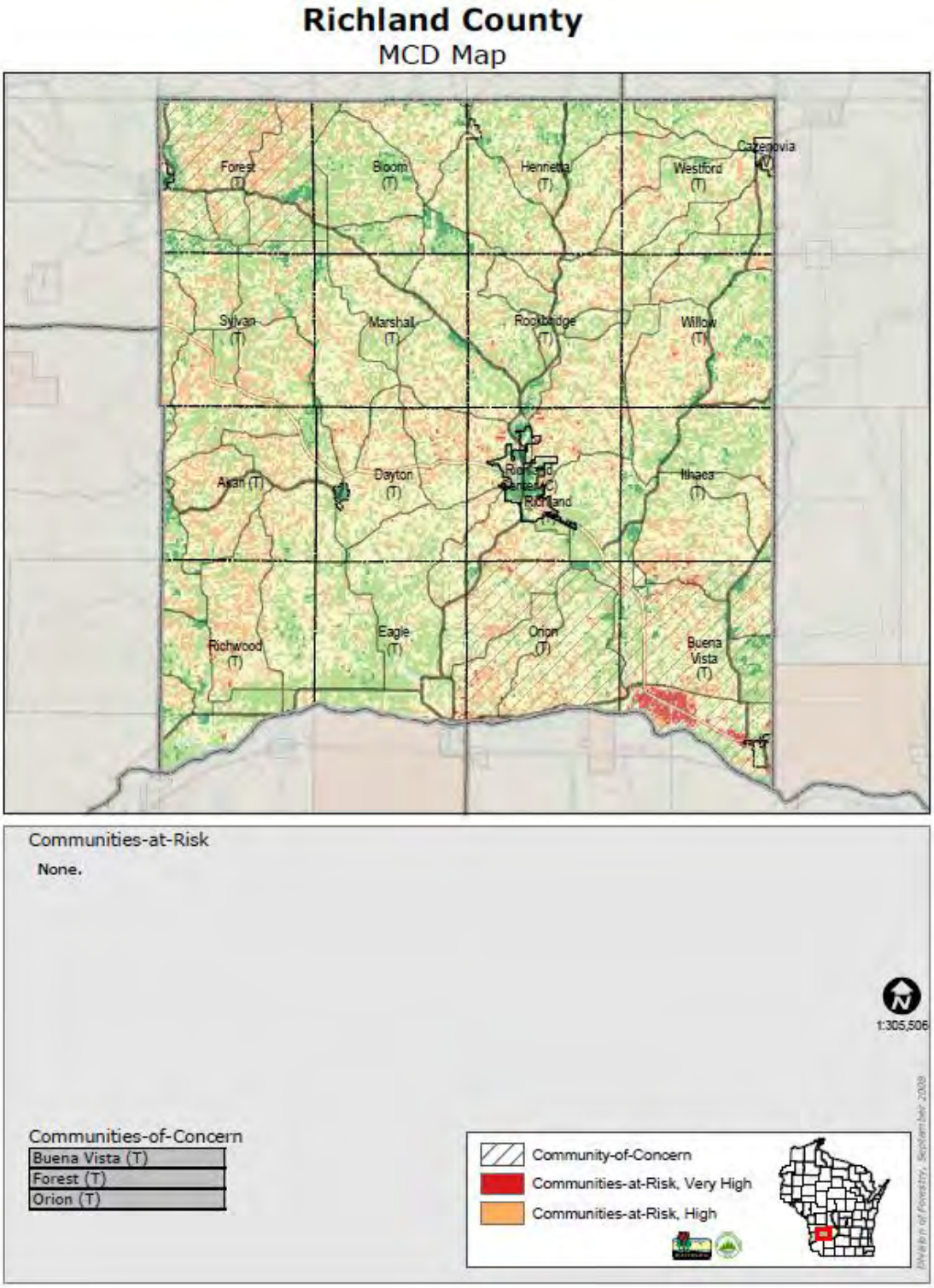


Richland County Critical Infrastructure



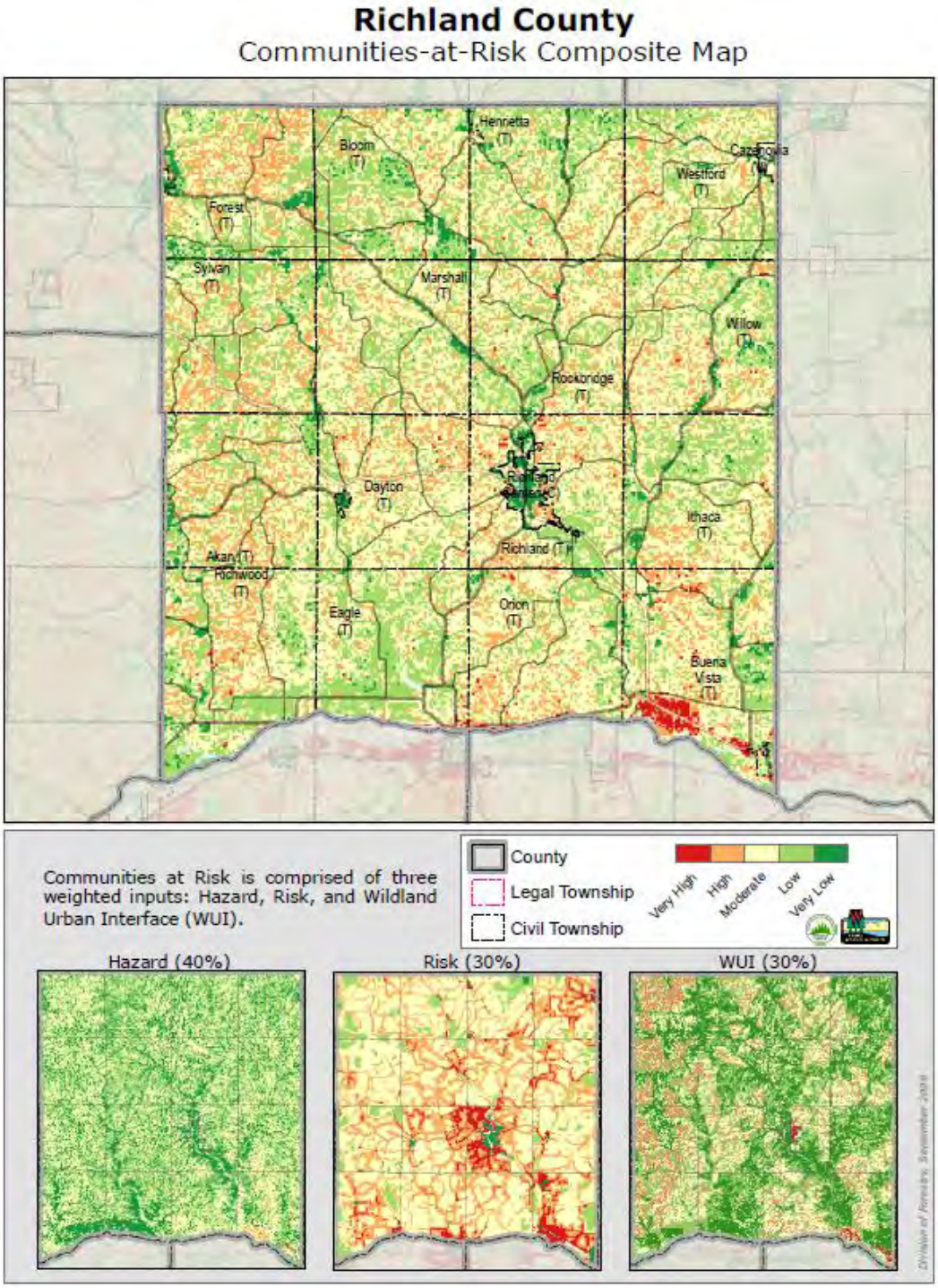
Richland Center Critical Infrastructure in the Floodplain

Richland County MCD Fire Map[118]



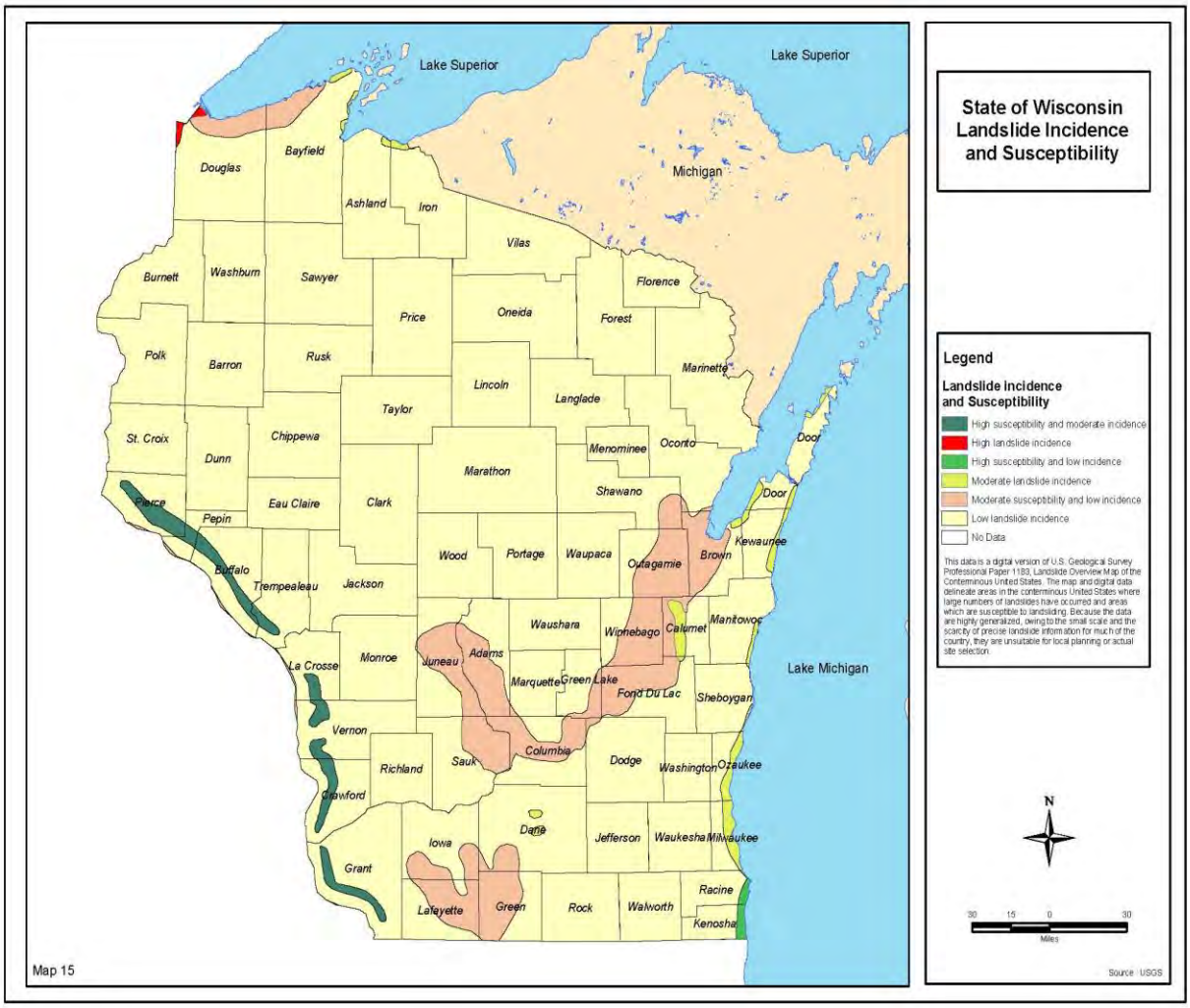
[118] Wisconsin Department of Natural Resources

Richland County Communities-At-Risk Composite Map[119]



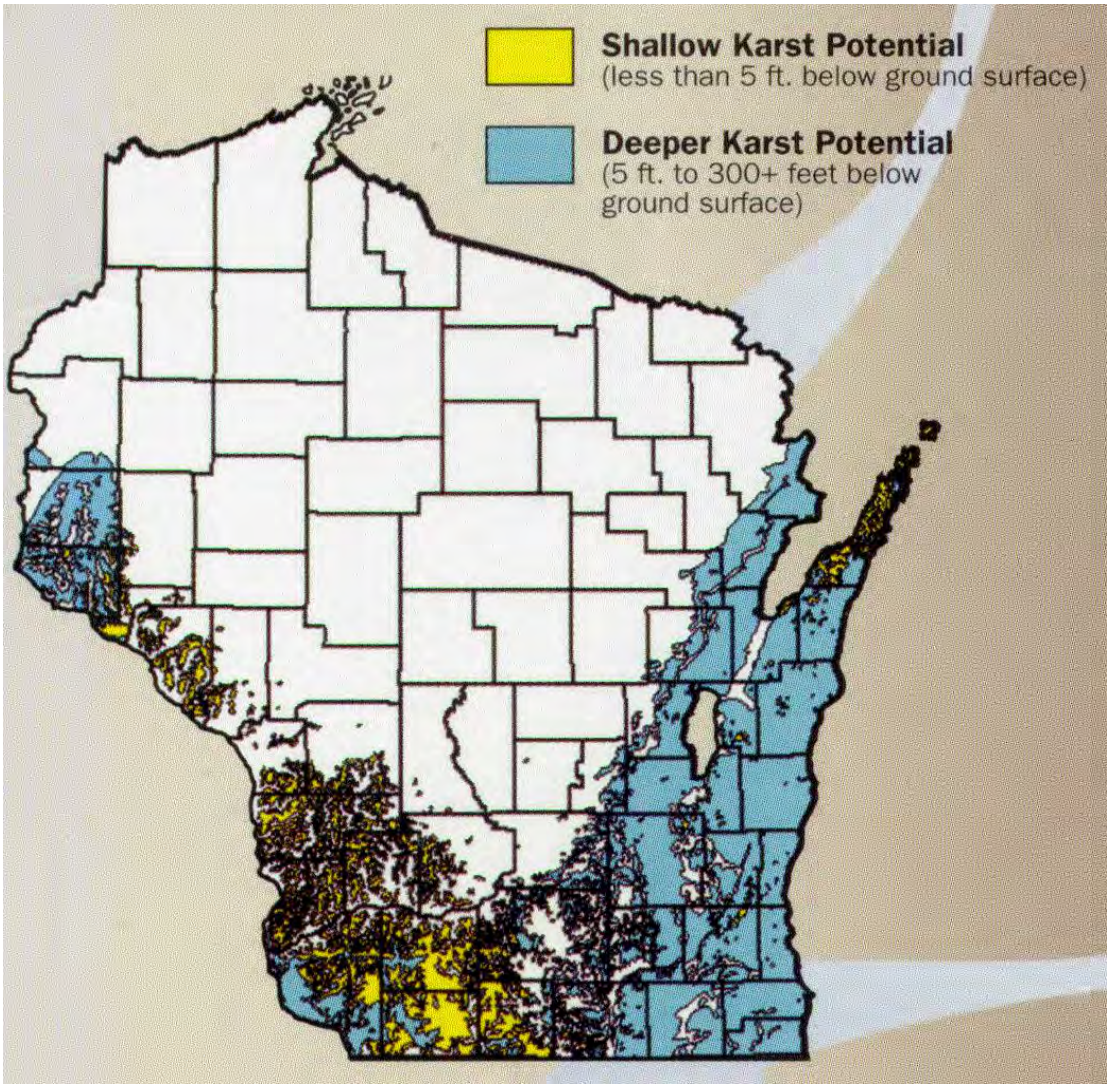
[119] Wisconsin Department of Natural Resources

Landslide Incidence and Susceptibility[120]



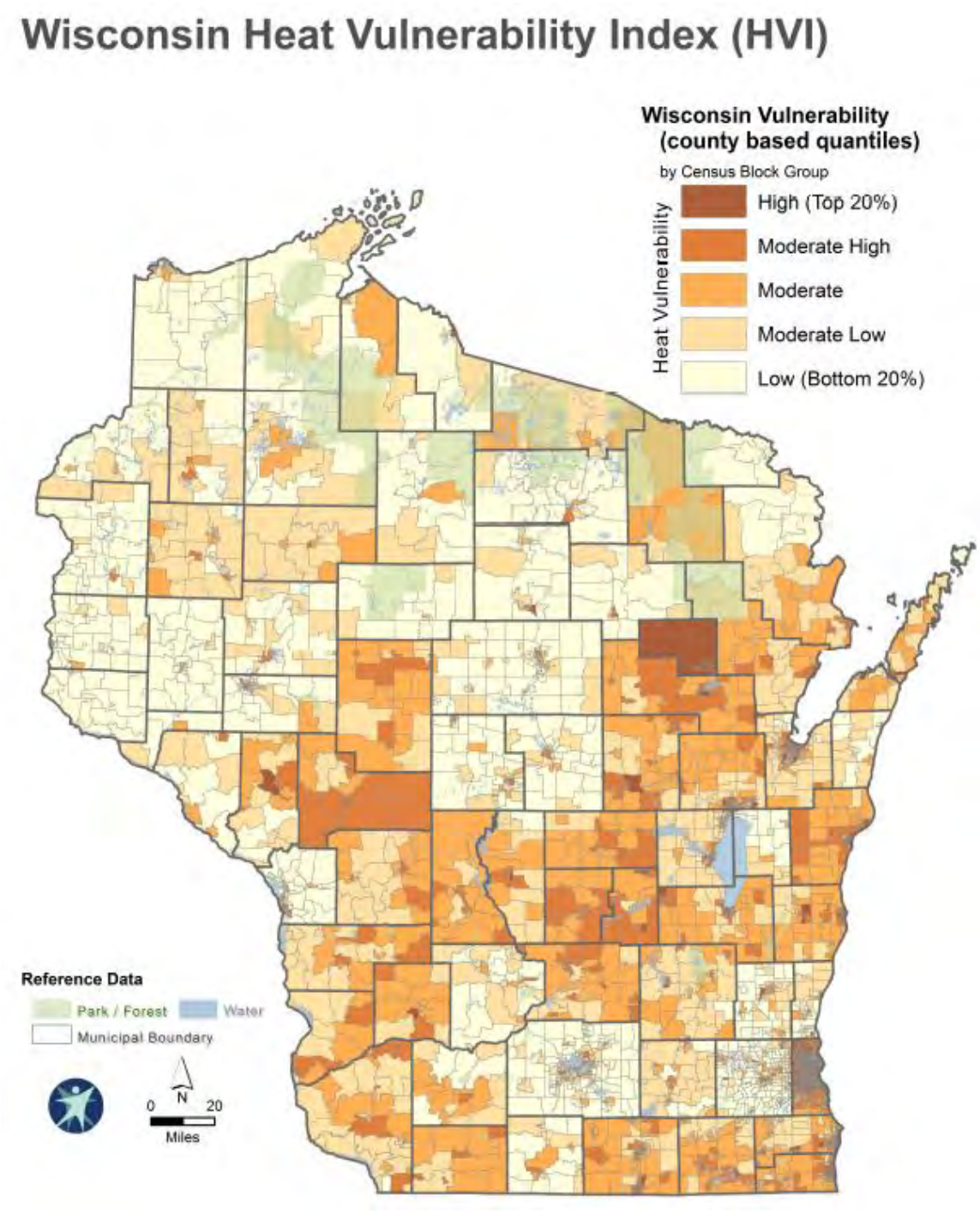
[120] Wisconsin State Hazard Mitigation Plan

Karst Potential[121]



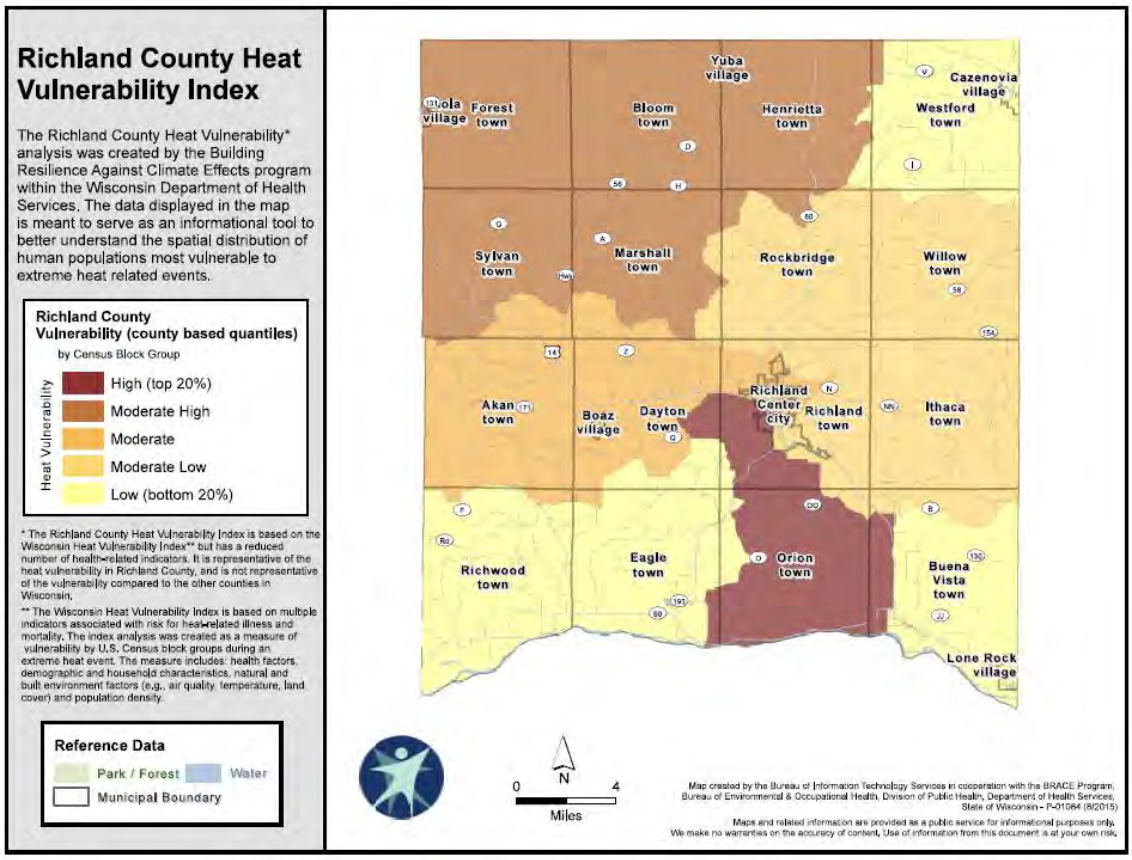
[121] Wisconsin State Hazard Mitigation Plan

Wisconsin Heat Vulnerability Index[122]



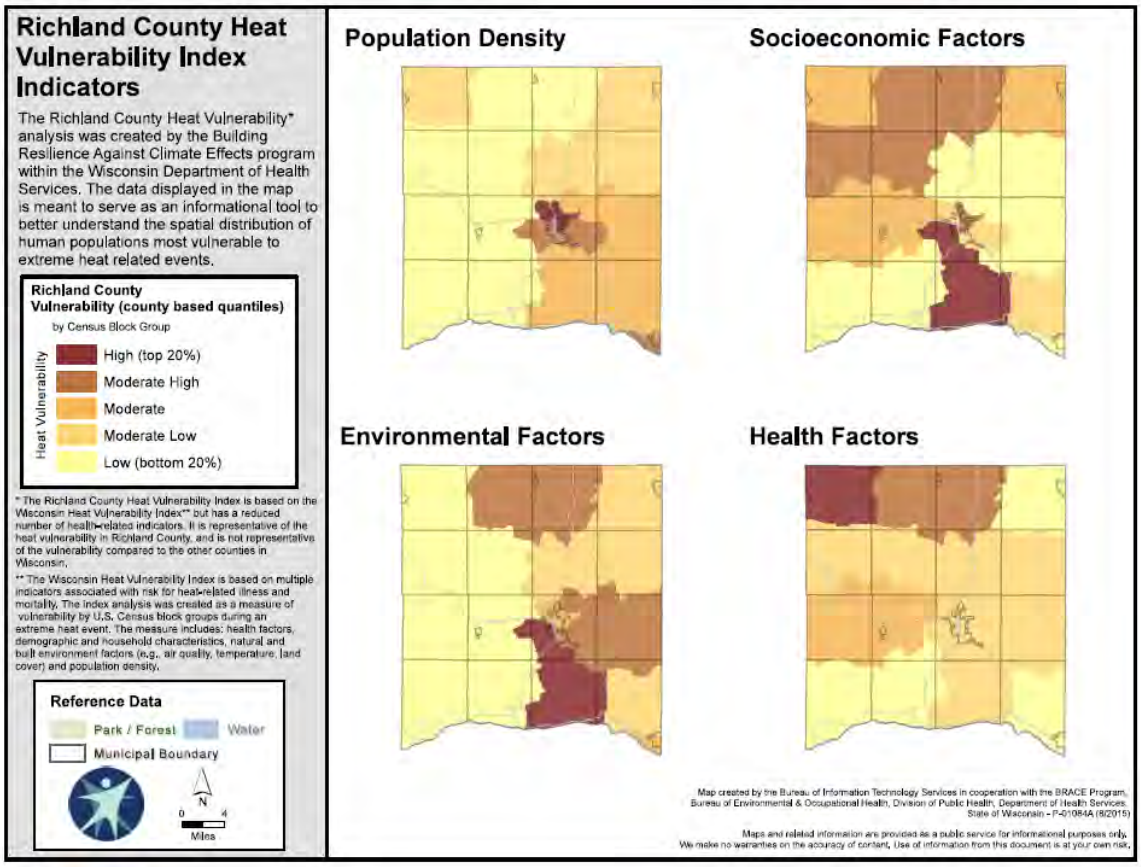
[122] https://www.dhs.wisconsin.gov/images/map-hvi-wi.jpg

Richland County Heat Vulnerability Index[123]



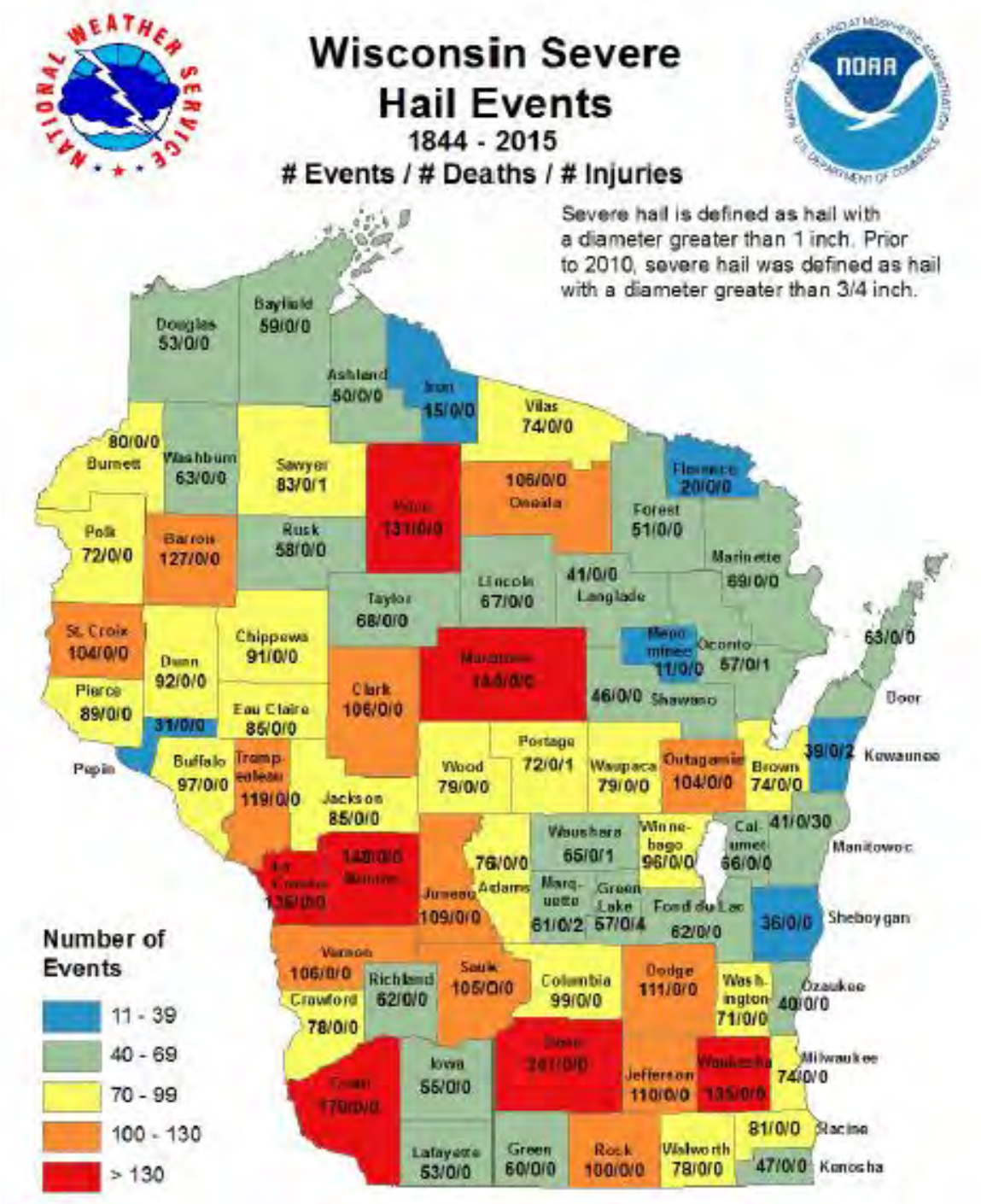
[123] https://www.dhs.wisconsin.gov/publications/p01084-richland.pdf

Richland County Heat Vulnerability Index Indicators [124]



[124] https://www.dhs.wisconsin.gov/publications/p01084a-richland.pdf

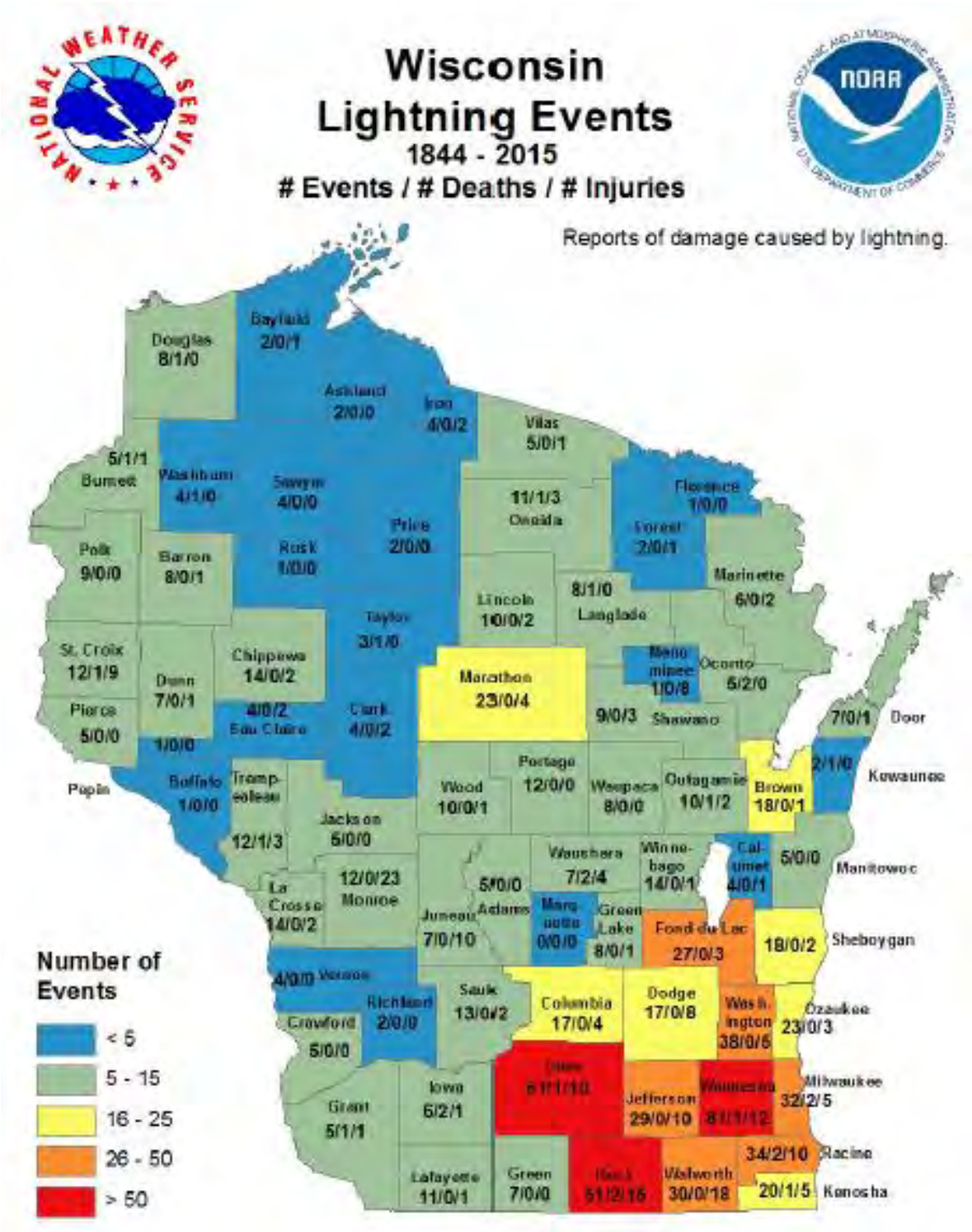
Wisconsin Hail[125]



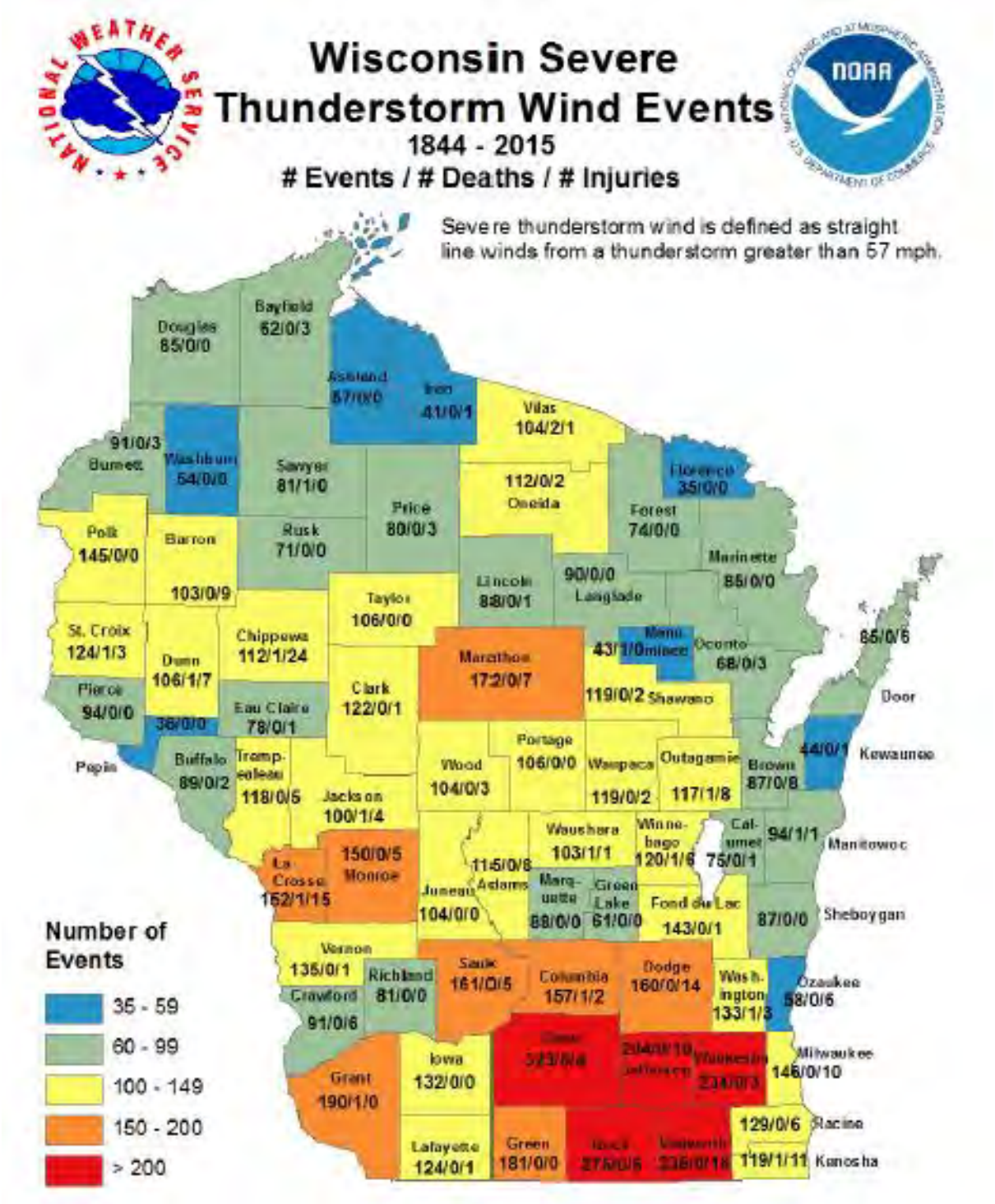
[125] Source: http://www.weather.gov/images/mkx/svr-wx-stats/Hail.jpg

Wisconsin Lightning[126]

[126] Source: http://www.weather.gov/images/mkx/svr-wx-stats/Lightning.jpg

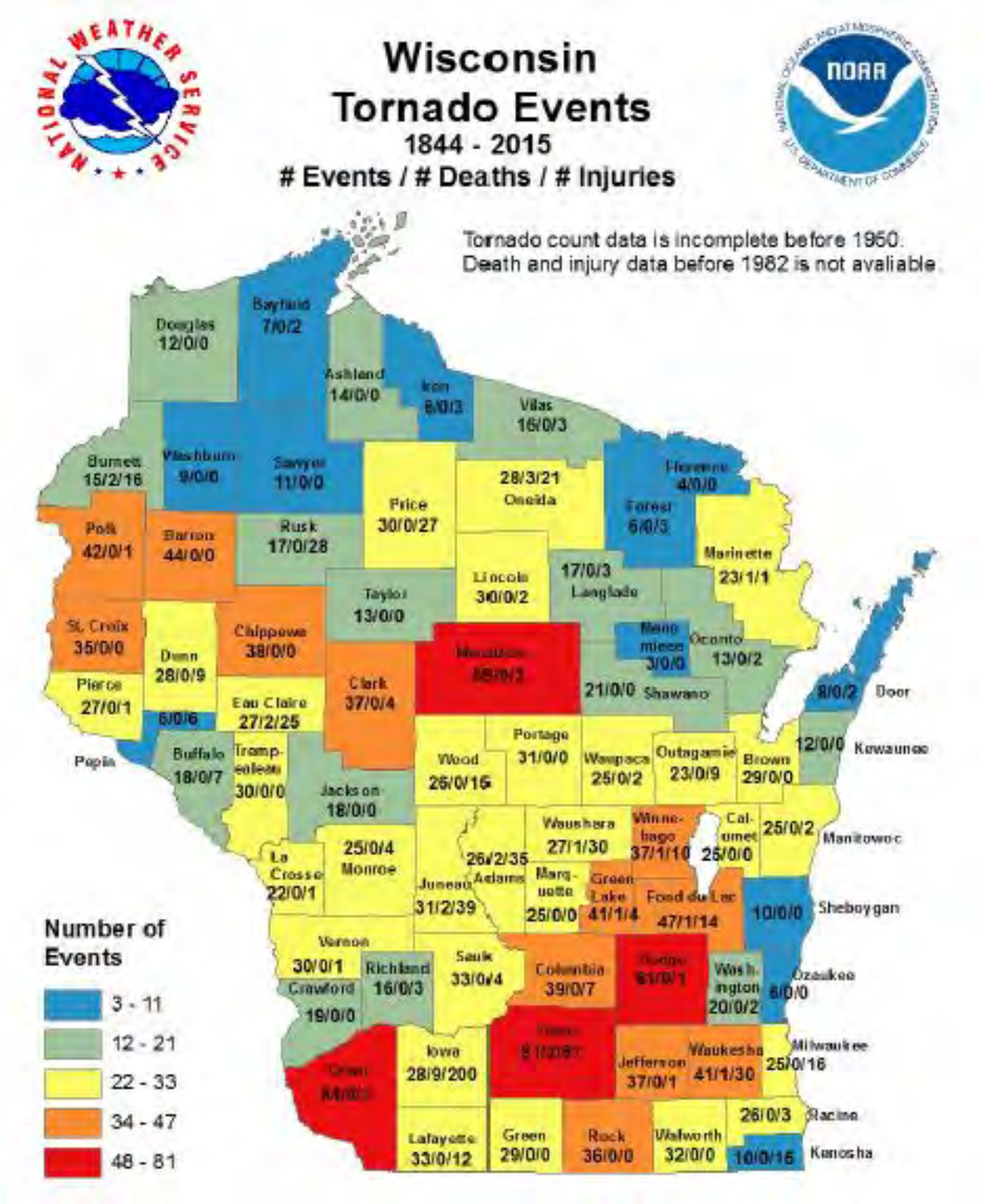

Wisconsin
Lightning Events
1844 - 2015
Events / # Deaths / # Injuries
Reports of damage caused by lightning.
NATIONAL WEATHER SERVICE
NOAA
Douglas 8/1/0
Bayfield 2/0/1
Ashland 2/0/0
Iron 4/0/2
Vilas 5/0/1
Florence 1/0/0
Forest 2/0/1
Oneida 11/1/3
Marinette 6/0/2
Burnett 5/1/1
Washburn 4/1/0
Sawyer 4/0/0
Price 2/0/0
Rusk 1/0/0
Polk 9/0/0
Barron 8/0/1
Taylor 3/1/0
Lincoln 10/0/2
Langlade 8/1/0
Menominee 1/0/8
Oconto 5/2/0
St. Croix 12/1/9
Dunn 7/0/1
Chippewa 14/0/2
Eau Claire 4/0/2
Clark 4/0/2
Marathon 23/0/4
Shawano 9/0/3
Door 7/0/1
Pierce 5/0/0
Pepin 1/0/0
Buffalo 1/0/0
Trempealeau 12/1/3
Jackson 6/0/0
Wood 10/0/1
Portage 12/0/0
Waupaca 8/0/0
Outagamie 10/1/2
Brown 18/0/1
Kewaunee 2/1/0
La Crosse 14/0/2
Monroe 12/0/23
Juneau 7/0/10
Adams 5/0/0
Waushara 7/2/4
Winnebago 14/0/1
Calumet 4/0/1
Manitowoc 5/0/0
Marquette 0/0/0
Green Lake 8/0/1
Fond du Lac 27/0/3
Sheboygan 18/0/2
Vernon 4/0/0
Richland 2/0/0
Crawford 5/0/0
Sauk 13/0/2
Columbia 17/0/4
Dodge 17/0/8
Washington 38/0/6
Ozaukee 23/0/3
Dane 61/1/10
Jefferson 29/0/10
Waukesha 81/1/12
Milwaukee 32/2/5
Grant 5/1/1
Iowa 6/2/1
Lafayette 11/0/1
Green 7/0/0
Rock 51/2/16
Walworth 30/0/18
Racine 34/2/10
Kenosha 20/1/5
Number of Events
< 5
5 - 15
16 - 25
26 - 50
> 50

Wisconsin Severe Thunderstorm Winds[127]



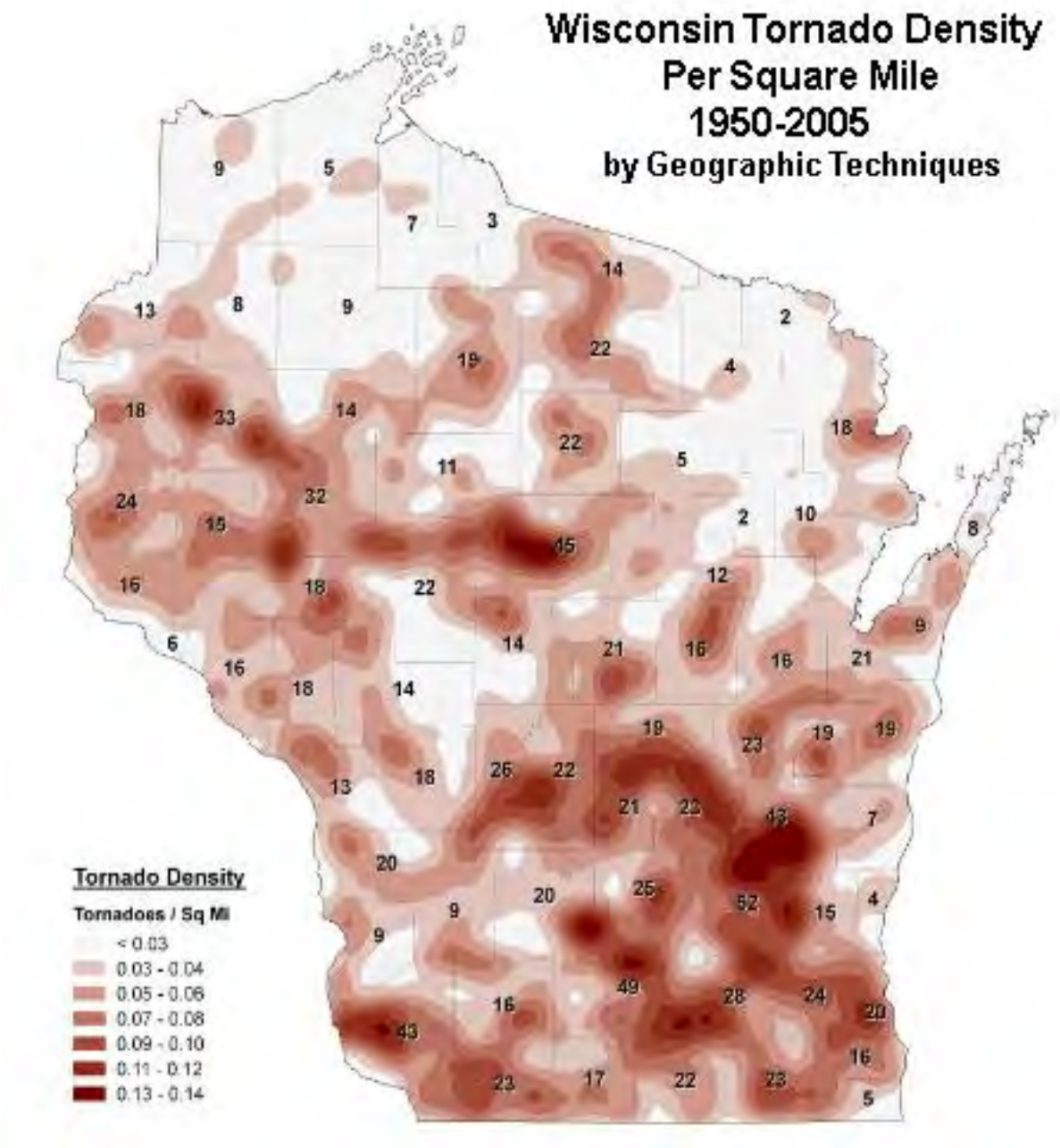
[127] Source: http://www.weather.gov/images/mkx/svr-wx-stats/TstormWind.jpg

Wisconsin Tornadoes (1844-2015) [128]

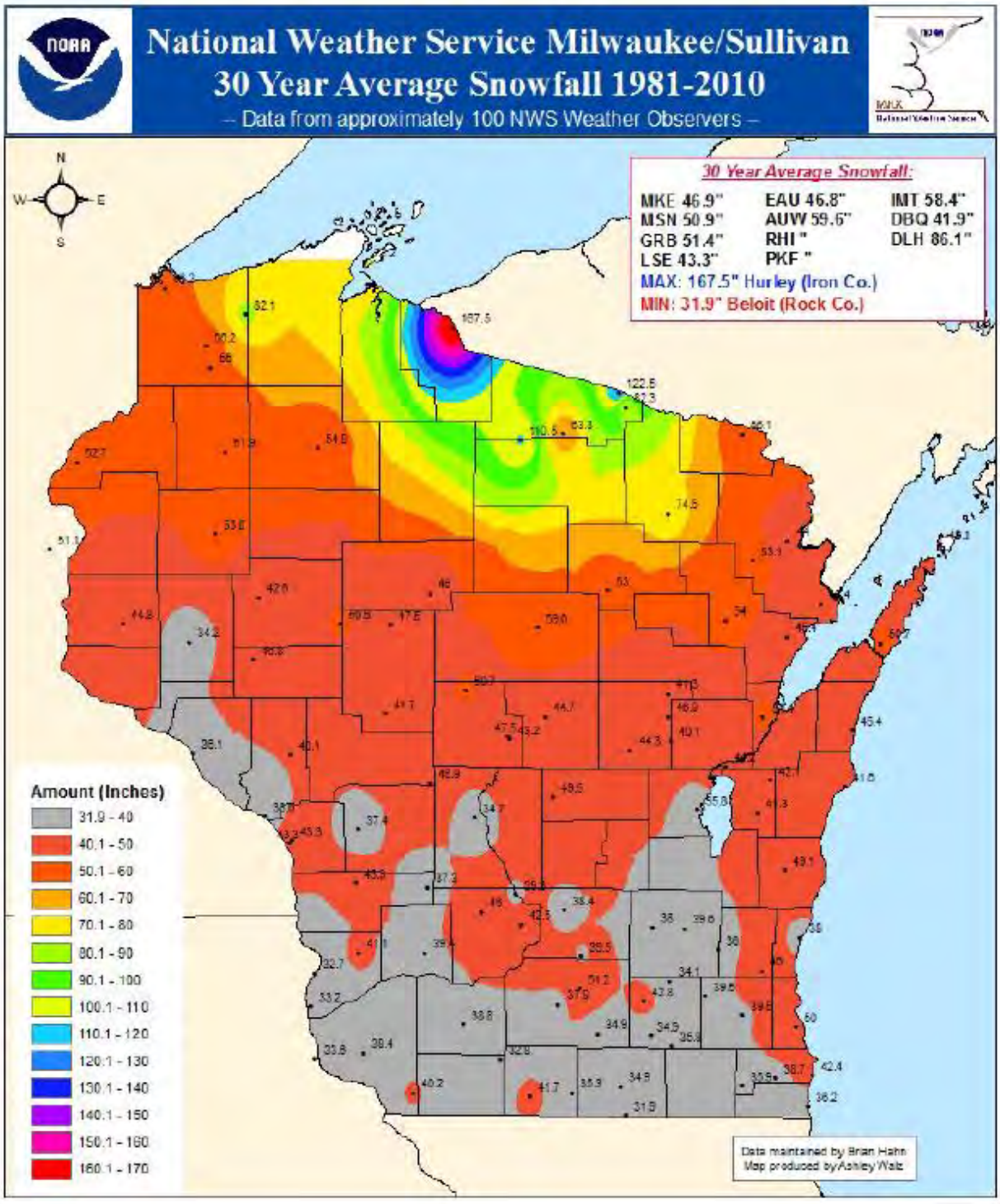


[128] Source: http://www.weather.gov/images/mkx/svr-wx-stats/Tornado.jpg

Wisconsin Tornado Density

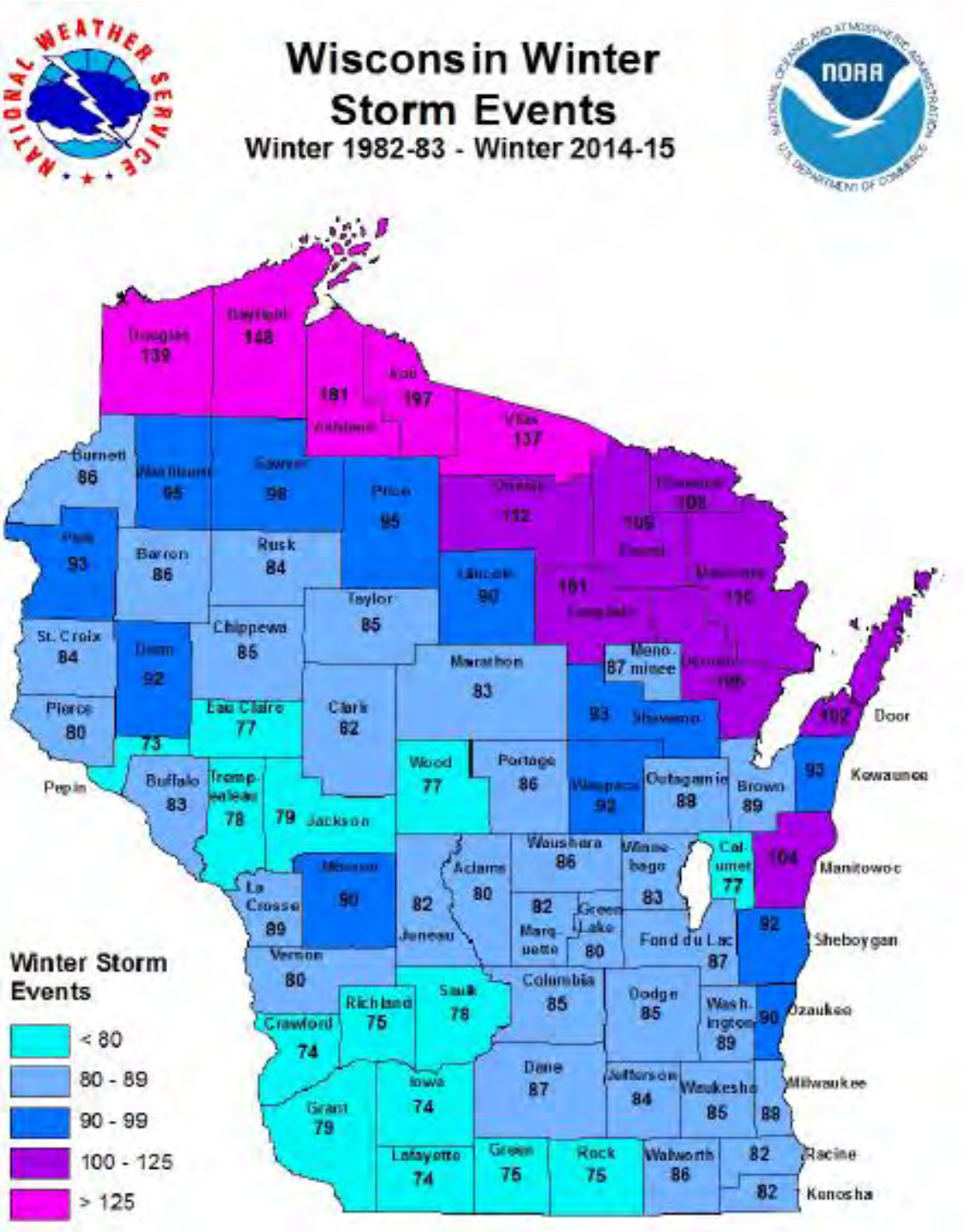


Wisconsin Average 30-Year Snowfall[129]



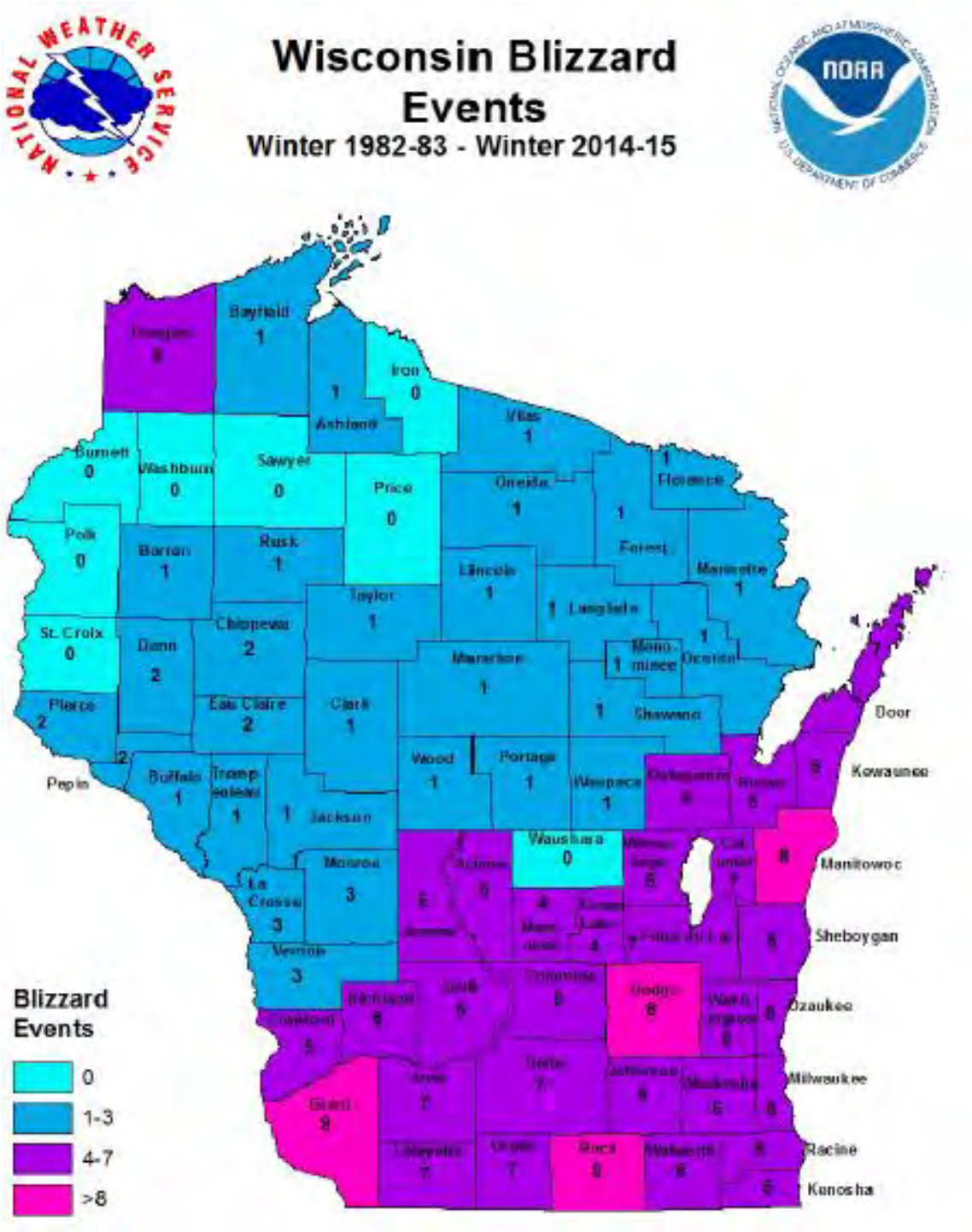
[129] http://www.weather.gov/images/mkx/climate/avg_30_year_snowfall.png

Wisconsin Winter Storm Events [130]



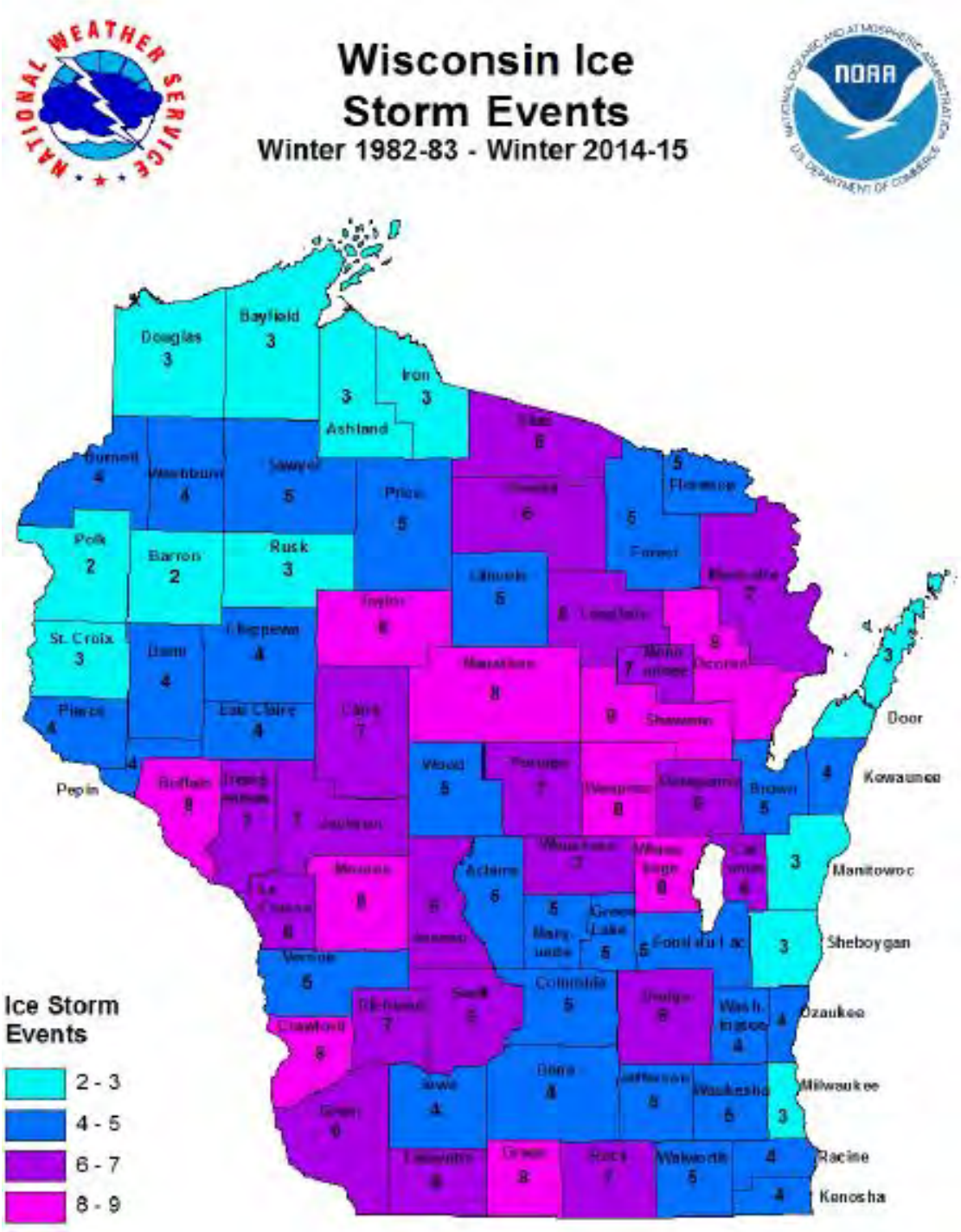
[130] Source: http://www.weather.gov/images/mkx/images/svr-wx-stats/WinterStorm.jpg

Wisconsin Blizzard Events [131]



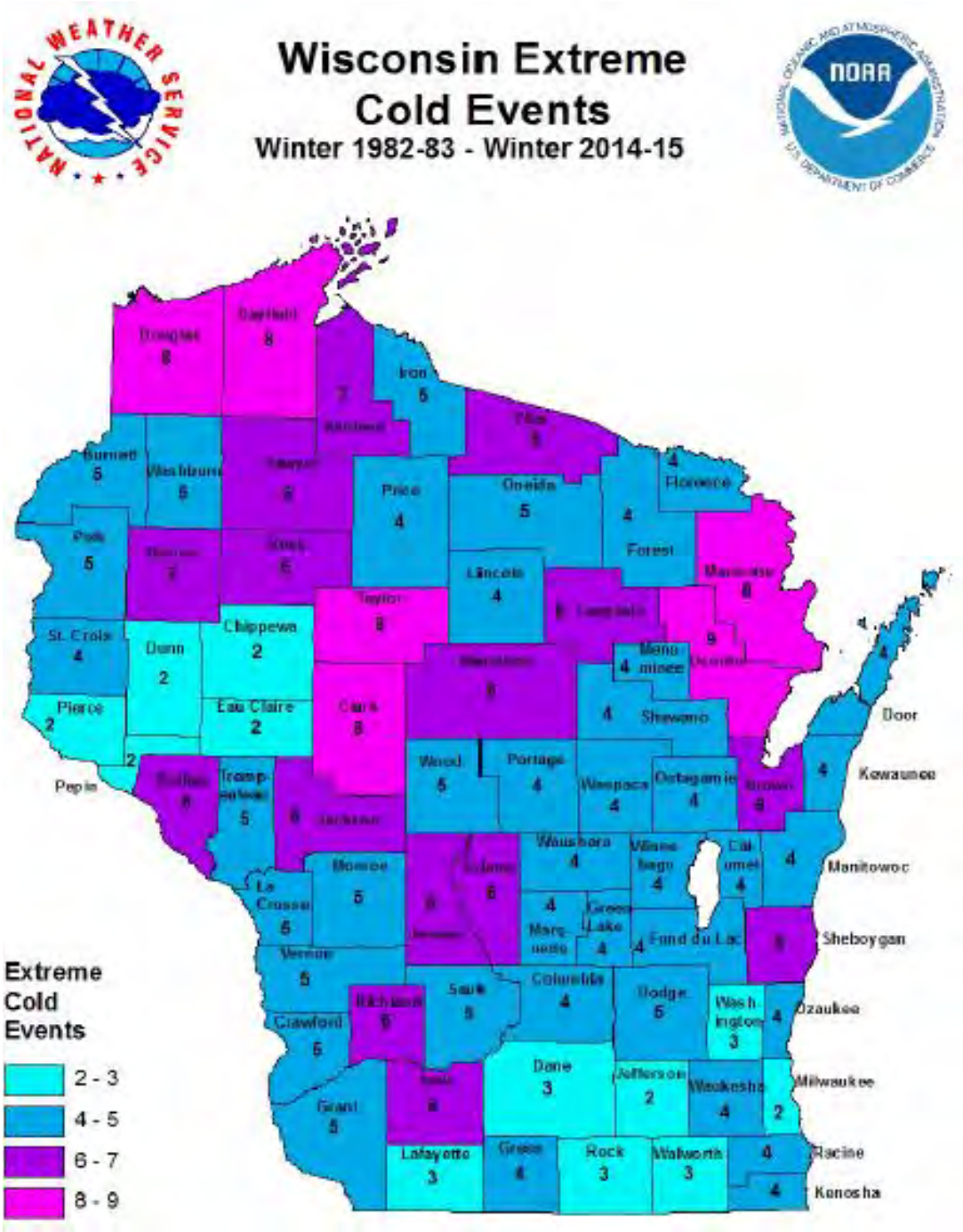
[131] Source: http://www.weather.gov/images/mkx/images/svr-wx-stats/Blizzard.jpg

Wisconsin Ice Storm Events [132]



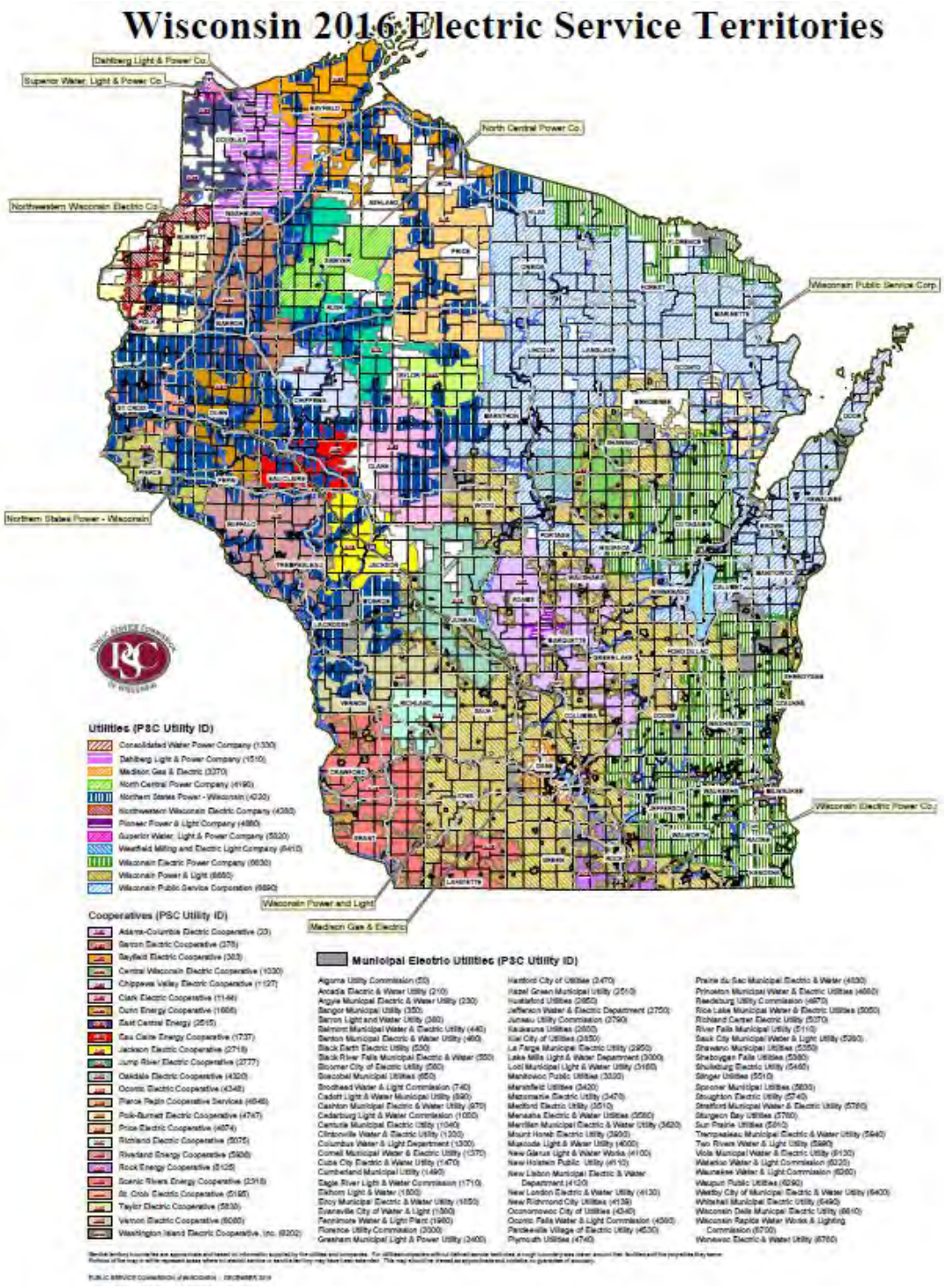
[132] Source: http://www.weather.gov/images/mkx/images/svr-wx-stats/IceStorm.jpg

Wisconsin Extreme Cold Events [133]



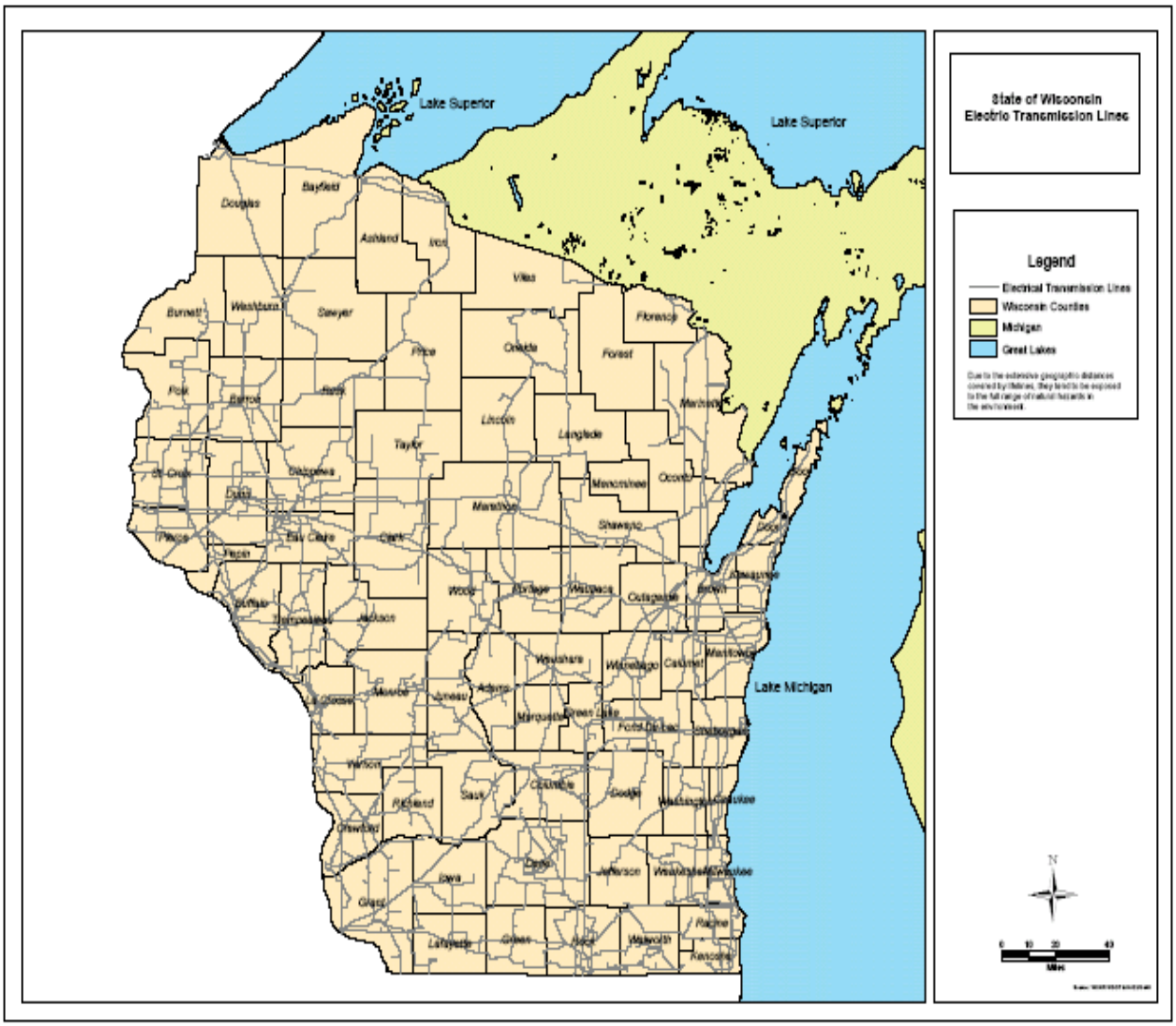
[133] Source: http://www.weather.gov/images/mkx/images/svr-wx-stats/ExtremeCold.jpg

Wisconsin Electric Service Territories[134]



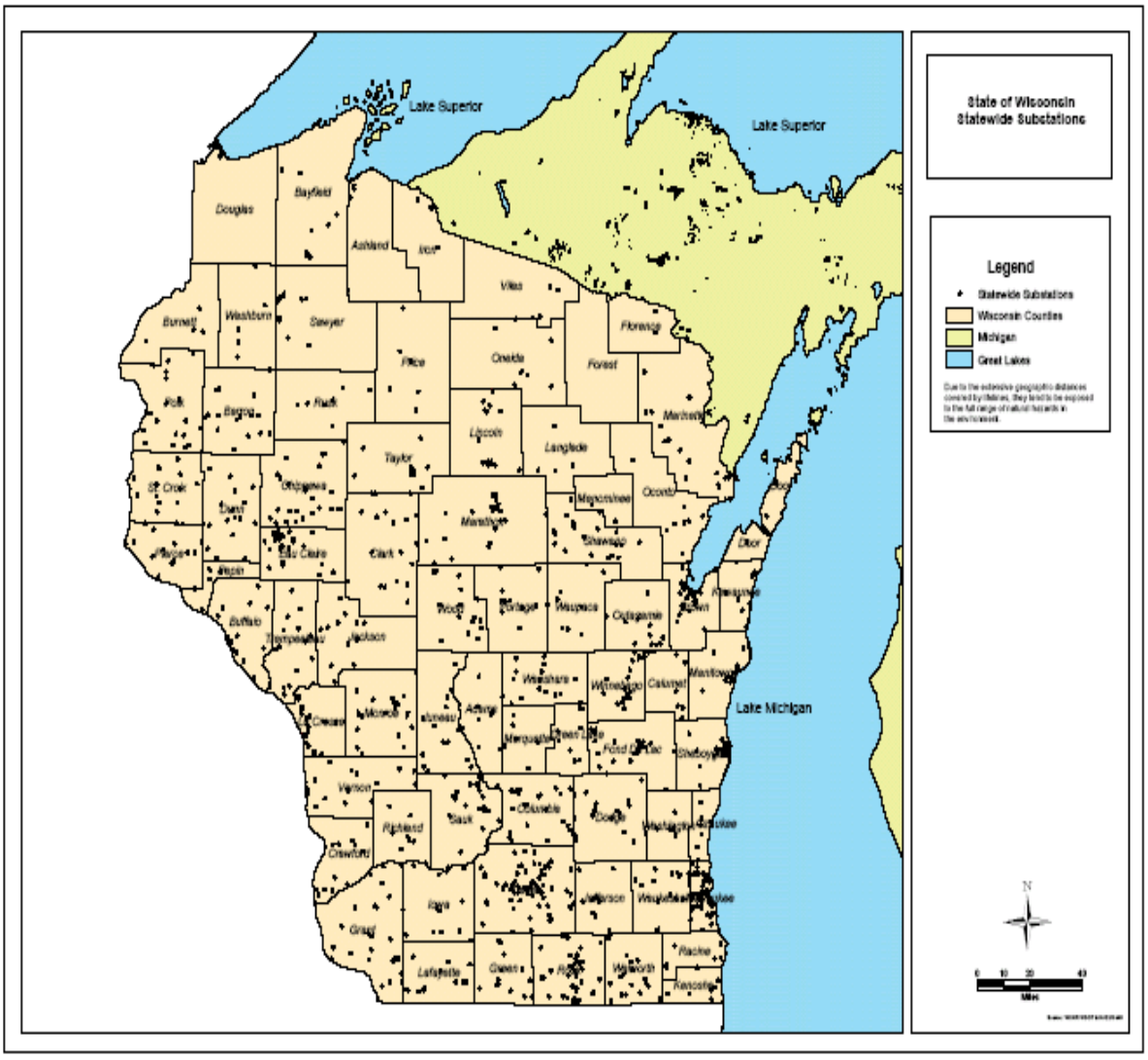
[134] http://www.psc.wi.gov/utilityinfo/maps/documents/largeElectricMap.pdf

Electric Transmission Lines[135]



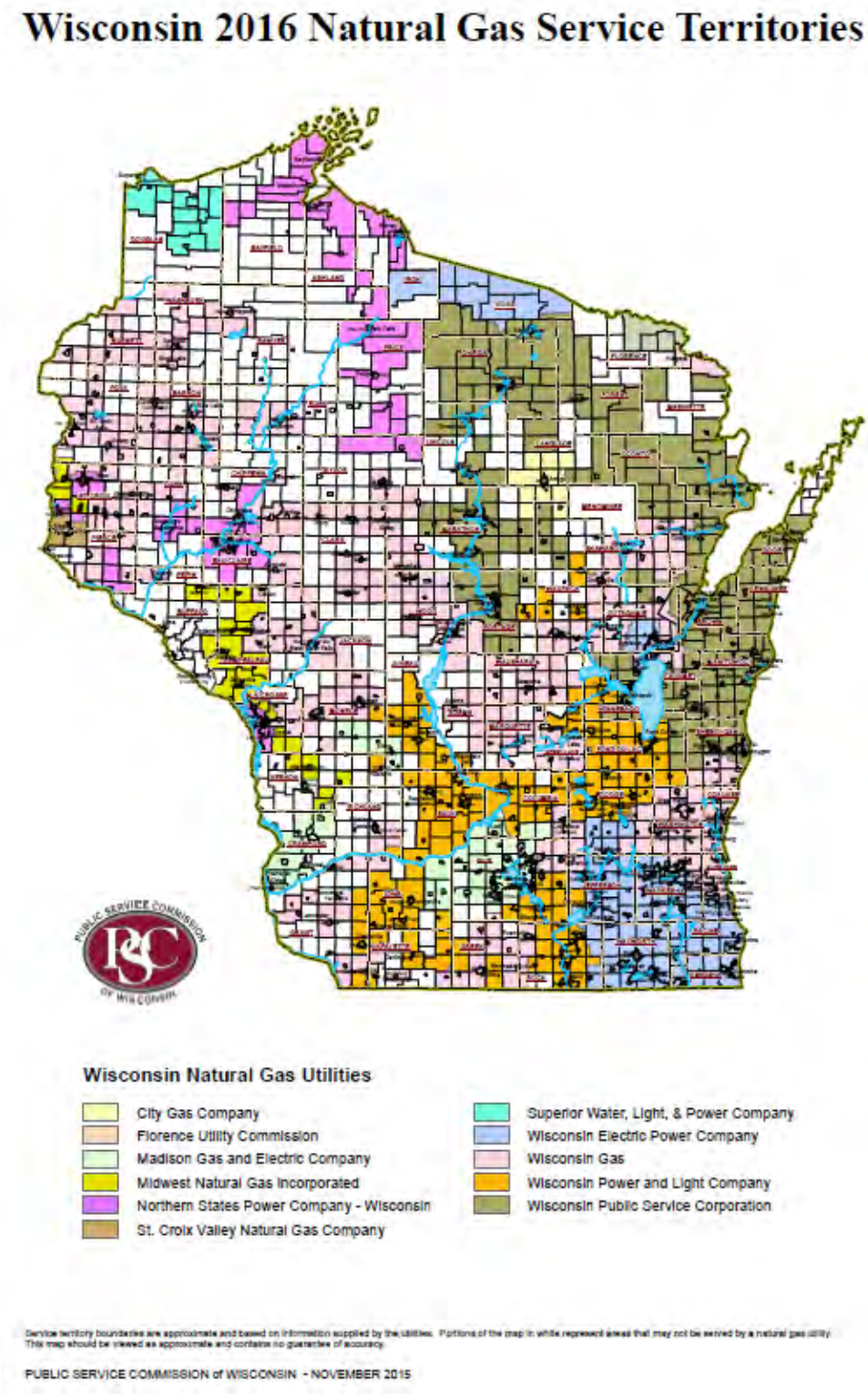
[135] Wisconsin State Hazard Mitigation Plan

Electrical Substations[136]



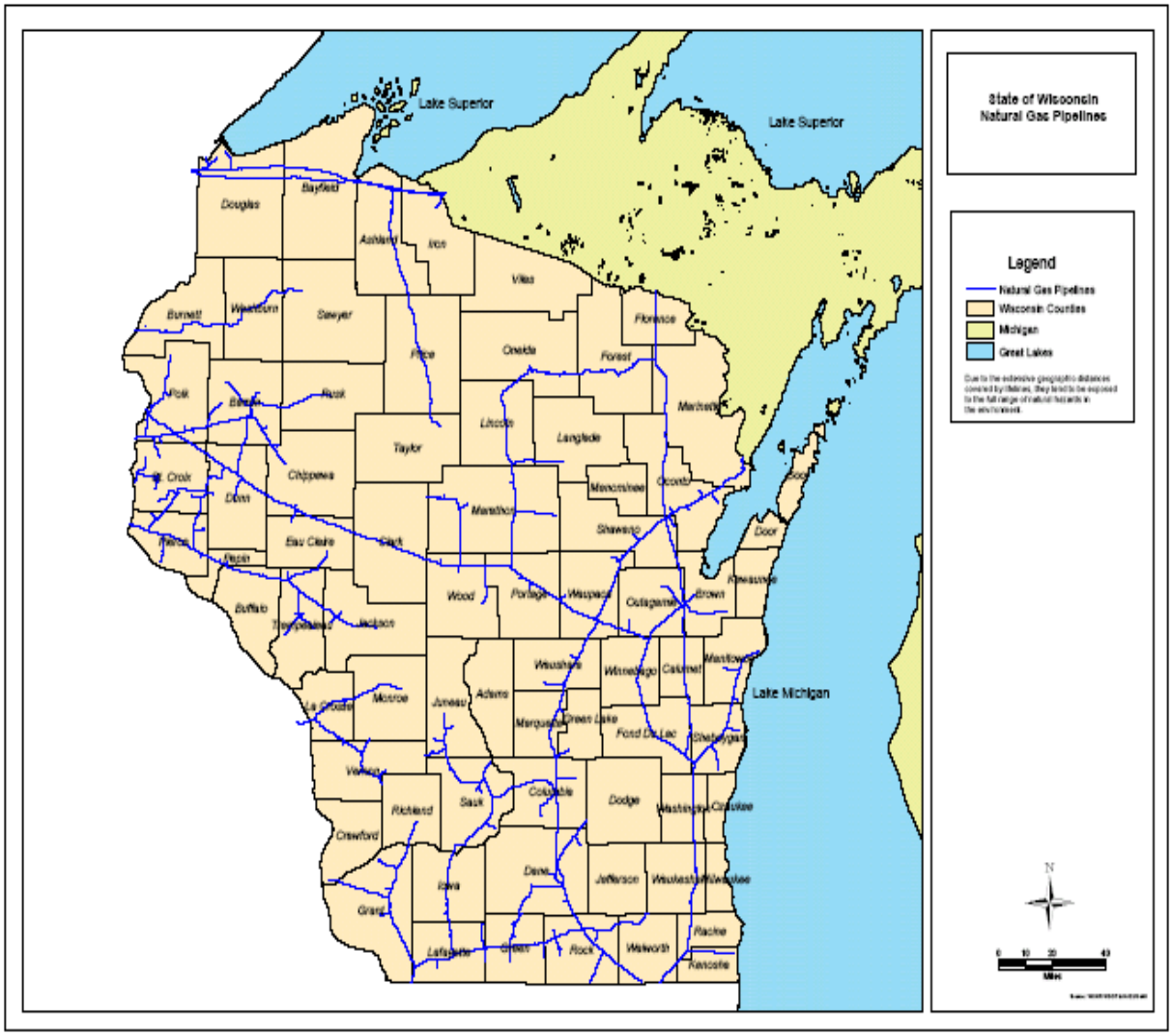
[136] Wisconsin State Hazard Mitigation Plan

Wisconsin Natural Gas Service Territories[137]



[137] http://psc.wi.gov/utilityinfo/maps/documents/medGasMap.pdf

Natural Gas Pipelines[138]



[138] Wisconsin State Hazard Mitigation Plan

Wastewater Facilities[139]

[139] Wisconsin State Hazard Mitigation Plan

Appendix B: Plan Adoption

A resolution adopting this plan has been passed by the Richland County Board, the City of Richland Center; the Villages of Boaz, Viola, and Yuba; and the Towns of Akan, Bloom, Dayton, Eagle, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford, and Willow. The Villages of Cazenovia and Lone Rock as well as the Towns of Buena Vista and Forest did not choose to independently adopt the plan.

U.S. Department of Homeland Security
Region V
536 S. Clark St., 6th Floor
Chicago, IL 60605-1509

FEMA

APR 14 2017

Ms. Katie Sommers
State Hazard Mitigation Officer
Wisconsin Emergency Management
2400 Wright Street, P.O. Box 7865
Madison, WI 53707-7865

Dear Ms. Sommers:

Thank you for submitting the adoption documentation for the Richland County Hazard Mitigation Plan. The plan was reviewed based on the local plan criteria contained in 44 CFR Part 201, as authorized by the Disaster Mitigation Act of 2000. The Richland County plan became effective on March 20, 2017 and the plan is now approved for the Village of Boaz and the towns of Bloom, Marshall, Richwood, Rockbridge, and Sylvan. Please submit the adoption resolutions for any remaining jurisdictions who participated in the planning process.

The approval of this plan ensures continued availability of the full complement of Hazard Mitigation Assistance (HMA) Grants. All requests for funding, however, will be evaluated individually according to the specific eligibility and other requirements of the particular program under which the application is submitted.

We encourage Richland County and the participating jurisdictions to follow the plan's schedule for monitoring and updating the plan, and continue their efforts to implement the mitigation measures. The expiration date of the Richland County Plan is March 20, 2022. In order to continue project grant eligibility, the plan must be reviewed, revised as appropriate, resubmitted, and approved no later than the plan expiration date.

Please pass on our congratulations to the county and jurisdictions for completing this significant action. If you or the communities have any questions, please contact Christine Meissner at (312) 408-4460 or christine.meissner@fema.dhs.gov.

Sincerely,

Mark J. Peterson, Acting Division Director
Mitigation Division

www.fema.gov

STATE OF WISCONSIN

DEPARTMENT OF MILITARY AFFAIRS

DIVISION OF EMERGENCY MANAGEMENT

Brian M. Satula
Administrator

Scott Walker
Governor

October 18, 2016

Eric Kuklewski, Branch Chief
Risk Analysis Branch, Mitigation Division
Federal Emergency Management Agency
536 S. Clark Street, 6th Floor
Chicago, IL 60605

Attn: Christine Meissner

Dear Christine:

I am pleased to submit the *Hazard Mitigation Plan, Richland County, Wisconsin*, update that meets the requirements of 44 CFR §201.6 and §78.5. Enclosed are the completed Local Hazard Mitigation Plan Review Tool and CD containing an electronic copy of the plan and the Plan Review Tool.

Richland County updated the plan utilizing a FEMA-1966-DR planning grant. With the submission of the plan, I request that the plan be conditionally approved. Upon approval of the plan, the County and participating jurisdictions will be eligible to apply for mitigation funds through the Hazard Mitigation Grant Program, Pre-Disaster Mitigation program, and Flood Mitigation Assistance program.

If you have questions, please call me at (608) 242-3222.

Sincerely,

Katie Sommers, CFM
State Hazard Mitigation Officer

Enclosures

Cc: Darin Gudgeon, Richland County Emergency Management Director
Paul Fratce, Southwest Regional Emergency Management Director
Lenore Borchardt, EPTEC, Inc.

2400 Wright St. PO Box 7865 Madison, WI 53707-7865 24 Hour Emergency HotLine 1-800-943-0003

County Clerk's Office

Richland County, Wisconsin

Victor V. Vlasek
County Clerk
Administrative Coordinator

Courthouse - P.O. Box 310
Richland Center, Wisconsin 53581

(608) 647-2197
Fax: (608) 647-6134
Email: victor.vlasek@co.richland.wi.us

January 11, 2017

Dear Honorable Board Members:

Please be advised that the January meeting of the Richland County Board of Supervisors will convene at 10:00 a.m., Tuesday, January 17, 2017, in the County Board Room, located on the Third Floor of the Courthouse, 181 West Seminary Street, Richland Center, Wisconsin.

Sincerely,

Victor V. Vlasek
Richland County Clerk

Agenda:

1. Roll Call
2. Invocation
3. Pledge Of Allegiance
4. Approve Agenda
5. Approve Minutes of December Session
6. Resolution Noting With Appreciation The Retirement of Jeanne Rice from the Ambulance Service
7. Resolution Noting With Appreciation The Retirement of Melvin "Bob" Frank from the Sheriff's Department
8. Resolution Noting With Appreciation The Retirement Of Three Employees At Pine Valley Community Village
9. Resolution Relating To Canceling Stale County Checks
10. Resolution Canceling Stale Tax Certificates And Making An Appropriation
11. Resolution Amending The Committee Structure Resolution By Creating The Criminal Justice Coordinating Committee
12. Resolution Electing Ms. Karen Kusek-Lucas As Richland County Veterans Service Officer
13. Resolution Capping The County's Contribution To The Monthly Premium For Dental Insurance
14. Resolution Making A Transfer Of Funds Received From The City Of Richland Center
15. Resolution Dissolving The Long Term Care District Known As Continuia
16. Resolution Making A Purchase Of Two New Tractors With Mower Conditioners By The County Highway Department
17. Resolution Making Two Minor Amendments To The Richland County Highway Department's Addendum To The Richland County Handbook of Personnel Policies and Work Rules
18. Resolution Approving The Purchase Of Exercise Equipment By The Symons Recreational Board With Donated Funds
19. Resolution Making Fund Transfers From The Symons Recreation's Donations Account In The 2016 County Budget
20. Resolution Increasing Shift Differential And Weekend Differential Compensation For The Nursing And Patient Care Staff At Pine Valley Community Village
21. Resolution Directing Committee Chairs To Seek Cost Savings In The Departments Which They Supervise
22. Resolution Approving An Updated County All-Hazard Mitigation Plan
23. Resolution Authorizing the Emergency Management Department To Apply For A Hazard Mitigation Grant
24. Resolution Extending The Expiration Date Of The Temporary Subcommittee Of The Joint Ambulance Committee
25. Resolution Amending The Procedure For Making Payments From The Institutional Children Care Fund and The Institutional Adult Care Fund
26. Resolution Approving Amendments To 2016 And 2017 Contracts With The Department Health and Human Services Department
27. Ordinance Relative To The Raymond And Barbara Wood Parcel In The Town Of Dayton

RESOLUTION # 2017-4

ADOPTING THE UPDATED RICHLAND COUNTY ALL HAZARDS MITIGATION PLAN

FISCAL IMPACT: None

WHEREAS, the City of Richland Center recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save tax payer dollars; and

WHEREAS, an updated All Hazards Mitigation Plan is required by FEMA as a condition of future grant funding for mitigation projects; and

WHEREAS, the City of Richland Center participated jointly in the planning process with Richland County and the other local units of government within the County to prepare an updated All Hazards Mitigation Plan, which was made available for review via a Legal Notice and a copy of which will reside permanently in the Richland County Emergency Management Office;

NOW, THEREFORE, BE IT RESOLVED, that the City Council of the City of Richland Center adopts the updated Richland County All Hazards Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Richland County Emergency Management Department will submit, on behalf of the City, the updated All Hazards Mitigation Plan to Wisconsin Emergency Management and Federal Emergency Management Agency officials for final review and approval. Minor changes made upon advice from Wisconsin Emergency Management and Federal Emergency Management Agency will not require re-adopting this resolution.

PASSED: 7-0

Certifying Official

RESOLUTION # 2017-1

ADOPTING THE UPDATED RICHLAND COUNTY ALL HAZARDS MITIGATION PLAN

FISCAL IMPACT: None

WHEREAS, the Village of Boaz recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save tax payer dollars; and

WHEREAS, an updated All Hazards Mitigation Plan is required by FEMA as a condition of future grant funding for mitigation projects; and

WHEREAS, the Village of Boaz participated jointly in the planning process with Richland County and the other local units of government within the County to prepare an updated All Hazards Mitigation Plan, which was made available for review via a Legal Notice and a copy of which will reside permanently in the Richland County Emergency Management Office;

NOW, THEREFORE, BE IT RESOLVED, that the Village Board of the Village of Boaz hereby adopts the updated Richland County All Hazards Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Richland County Emergency Management Department will submit, on behalf of the Village, the updated All Hazards Mitigation Plan to Wisconsin Emergency Management and Federal Emergency Management Agency officials for final review and approval. Minor changes made upon advice from Wisconsin Emergency Management and Federal Emergency Management Agency will not require re-adopting this resolution.

PASSED: 3-14-2017

Jean S. Fowler Clerk
Certifying Official

RESOLUTION # 17-01

ADOPTING THE UPDATED RICHLAND COUNTY ALL HAZARDS MITIGATION PLAN

FISCAL IMPACT: None

WHEREAS, the Village of Viola recognizes the threat that natural hazards pose to people and property: and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save tax payer dollars; and

WHEREAS, an updated All Hazards Mitigation Plan is required by FEMA as a condition of future grant funding for mitigation projects; and

WHEREAS, the Village of Viola participated jointly in the planning process with Richland County and the other local units of government within the County to prepare an updated All Hazards Mitigation Plan, which was made available for review via a Legal Notice and a copy of which will reside permanently in the Richland County Emergency Management Office;

NOW, THEREFORE, BE IT RESOLVED, that the Village Board of the Village of Viola hereby adopts the updated Richland County All Hazards Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Richland County Emergency Management Department will submit, on behalf of the Village, the updated All Hazards Mitigation Plan to Wisconsin Emergency Management and Federal Emergency Management Agency officials for final review and approval. Minor changes made upon advice from Wisconsin Emergency Management and Federal Emergency Management Agency will not require re-adopting this resolution.

PASSED: 2/14/2017

Eugene Gabrysiak, Village President

Beth Campbell, Clerk/Treasurer/Admin.

RESOLUTION # 2017-1

ADOPTING THE UPDATED RICHLAND COUNTY ALL HAZARDS MITIGATION PLAN

FISCAL IMPACT: None

WHEREAS, the Village of Yuba recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save tax payer dollars; and

WHEREAS, an updated All Hazards Mitigation Plan is required by FEMA as a condition of future grant funding for mitigation projects; and

WHEREAS, the Village of Yuba participated jointly in the planning process with Richland County and the other local units of government within the County to prepare an updated All Hazards Mitigation Plan, which was made available for review via a Legal Notice and a copy of which will reside permanently in the Richland County Emergency Management Office;

NOW, THEREFORE, BE IT RESOLVED, that the Village Board of the Village of Yuba, hereby adopts the updated Richland County All Hazards Mitigation Plan as an official plan, and

BE IT FURTHER RESOLVED, that the Richland County Emergency Management Department will submit, on behalf of the Village, the updated All Hazards Mitigation Plan to Wisconsin Emergency Management and Federal Emergency Management Agency officials for final review and approval. Minor changes made upon advice from Wisconsin Emergency Management and Federal Emergency Management Agency will not require re-adopting this resolution.

PASSED: Yes 3/15/17

Certifying Official

Town of Akan

12249 State Hwy 171, Blue River, WI 53518

STATE OF WISCONSIN
Town of Akan
Richland County

Resolution Number 03-09-2017
All Hazards Mitigation Plan

Fiscal Impact: None

WHEREAS, The Town of Akan recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save tax payer dollars; and

WHEREAS, an updated All Hazards Mitigation Plan is required by FEMA as a condition of future grant funding for mitigation projects; and

WHEREAS, the Town of Akan participated jointly in the planning process with Richland County and the other local units of government within the County to prepare an updated All Hazards Mitigation Plan, which was made available for review via a Legal Notice and a copy of which will reside permanently in the Richland County Emergency Management Office;

NOW, THEREFORE, BE IT RESOLVED, that the Town Board of the Town of Akan, hereby adopts the updated Richland County All Hazards Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Richland County Emergency Management Department will submit, on behalf of the Town, the updated All Hazards Mitigation Plan to Wisconsin Emergency Management and Federal Emergency Management Agency officials for final review and approval. Minor changes made upon advice from Wisconsin Emergency Management and Federal Emergency Management Agency will not require re-adopting this resolution.

The Town Clerk shall properly post this resolution as required under s. 60.80, Wis. Stats.

Adopted this 9th day of March, 2017.

William R. Van Der Molen, Chairman

Gary Dobbs, Supervisor

RESOLUTION # 2017-01

ADOPTING THE UPDATED RICHLAND COUNTY ALL HAZARDS MITIGATION PLAN

FISCAL IMPACT: None

WHEREAS, the Town of Bloom recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save tax payer dollars; and

WHEREAS, an updated All Hazards Mitigation Plan is required by FEMA as a condition of future grant funding for mitigation projects; and

WHEREAS, the Town of Bloom participated jointly in the planning process with Richland County and the other local units of government within the County to prepare an updated All Hazards Mitigation Plan, which was made available for review via a Legal Notice and a copy of which will reside permanently in the Richland County Emergency Management Office;

NOW, THEREFORE, BE IT RESOLVED, that the Town Board of the Town of Bloom, hereby adopts the updated Richland County All Hazards Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Richland County Emergency Management Department will submit, on behalf of the Town, the updated All Hazards Mitigation Plan to Wisconsin Emergency Management and Federal Emergency Management Agency officials for final review and approval. Minor changes made upon advice from Wisconsin Emergency Management and Federal Emergency Management Agency will not require re-adopting this resolution.

PASSED: Adopted this date of 14, March, 2017.

Calvin Brown
Certifying Official - Chairman, Calvin Brown

Stuart Miller
Stuart Miller, Supervisor

Duane Wallace
Duane Wallace, Supervisor

Shelly Schweiger
Shelly Schweiger, Clerk

RESOLUTION # 030817

ADOPTING THE UPDATED RICHLAND COUNTY ALL HAZARDS MITIGATION PLAN

FISCAL IMPACT: None

WHEREAS, the Town of Dayton recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save tax payor dollars; and

WHEREAS, an updated All Hazards Mitigation Plan is required by FEMA as a condition of future grant funding for mitigation projects; and

WHEREAS, the Town of Dayton participated jointly in the planning process with Richland County and the other local units of government within the County to prepare an updated All Hazards Mitigation Plan, which was made available for review via a Legal Notice and a copy of which will reside permanently in the Richland County Emergency Management Office;

NOW, THEREFORE, BE IT RESOLVED, that the Town Board of the Town of Dayton hereby adopts the updated Richland County All Hazards Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Richland County Emergency Management Department will submit, on behalf of the Town, the updated All Hazards Mitigation Plan to Wisconsin Emergency Management and Federal Emergency Management Agency officials for final review and approval. Minor changes made upon advice from Wisconsin Emergency Management and Federal Emergency Management Agency will not require re-adopting this resolution.

PASSED: 03/8/17

Richard G. Walker

Certifying Official

RESOLUTION # _____

ADOPTING THE UPDATED RICHLAND COUNTY ALL HAZARDS MITIGATION PLAN

FISCAL IMPACT: None

WHEREAS, the Town of Eagle recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save tax payer dollars; and

WHEREAS, an updated All Hazards Mitigation Plan is required by FEMA as a condition of future grant funding for mitigation projects; and

WHEREAS, the Town of Eagle participated jointly in the planning process with Richland County and the other local units of government within the County to prepare an updated All Hazards Mitigation Plan, which was made available for review via a Legal Notice and a copy of which will reside permanently in the Richland County Emergency Management Office.

NOW, THEREFORE, BE IT RESOLVED, that the Town Board of the Town of Eagle, hereby adopts the updated Richland County All Hazards Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Richland County Emergency Management Department will submit, on behalf of the Town, the updated All Hazards Mitigation Plan to Wisconsin Emergency Management and Federal Emergency Management Agency officials for final review and approval. Minor changes made upon advice from Wisconsin Emergency Management and Federal Emergency Management Agency will not require re-adopting this resolution.

PASSED: 3 0

_____

Certifying Official

RESOLUTION # 2017-1

ADOPTING THE UPDATED RICHLAND COUNTY ALL HAZARDS MITIGATION PLAN

FISCAL IMPACT: None

WHEREAS, the Town of Henrietta recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save tax payor dollars; and

WHEREAS, an updated All Hazards Mitigation Plan is required by FEMA as a condition of future grant funding for mitigation projects; and

WHEREAS, the Town of Henrietta participated jointly in the planning process with Richland County and the other local units of government within the County to prepare an updated All Hazards Mitigation Plan, which was made available for review via a Legal Notice and a copy of which will reside permanently in the Richland County Emergency Management Office;

NOW, THEREFORE, BE IT RESOLVED, that the Town Board of the Town of Henrietta hereby adopts the updated Richland County All Hazards Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Richland County Emergency Management Department will submit, on behalf of the Town, the updated All Hazards Mitigation Plan to Wisconsin Emergency Management and Federal Emergency Management Agency officials for final review and approval. Minor changes made upon advice from Wisconsin Emergency Management and Federal Emergency Management Agency will not require re-adopting this resolution.

PASSED: 3.9.17 3 for . 0 against , roll call vote taken

Certifying Official

Sent 3-6-17

RESOLUTION # 2017-03

ADOPTING THE UPDATED RICHLAND COUNTY ALL HAZARDS MITIGATION PLAN

FISCAL IMPACT: None

WHEREAS, the Town of Ithaca recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save tax payer dollars; and

WHEREAS, an updated All Hazards Mitigation Plan is required by FEMA as a condition of future grant funding for mitigation projects; and

WHEREAS, the Town of Ithaca participated jointly in the planning process with Richland County and the other local units of government within the County to prepare an updated All Hazards Mitigation Plan, which was made available for review via a Legal Notice and a copy of which will reside permanently in the Richland County Emergency Management Office;

NOW, THEREFORE, BE IT RESOLVED, that the Town Board of the Town of Ithaca, hereby adopts the updated Richland County All Hazards Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Richland County Emergency Management Department will submit, on behalf of the Town, the updated All Hazards Mitigation Plan to Wisconsin Emergency Management and Federal Emergency Management Agency officials for final review and approval. Minor changes been made upon advice from Wisconsin Emergency Management and Federal Emergency Management Agency will not require re-adopting this resolution.

PASSED: 03/06/2017

Certifying Official

RESOLUTION # 46

ADOPTING THE UPDATED RICHLAND COUNTY ALL HAZARDS MITIGATION PLAN

FISCAL IMPACT: None

WHEREAS, the Town of Marshall recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save tax payer dollars; and

WHEREAS, an updated All Hazards Mitigation Plan is required by FEMA as a condition of future grant funding for mitigation projects; and

WHEREAS, the Town of Marshall participated jointly in the planning process with Richland County and the other local units of government within the County to prepare an updated All Hazards Mitigation Plan, which was made available for review via a Legal Notice and a copy of which will reside permanently in the Richland County Emergency Management Office;

NOW, THEREFORE, BE IT RESOLVED, that the Town Board of the Town of Marshall hereby adopts the updated Richland County All Hazards Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Richland County Emergency Management Department will submit, on behalf of the Town, the updated All Hazards Mitigation Plan to Wisconsin Emergency Management and Federal Emergency Management Agency officials for final review and approval. Minor changes been made upon advice from Wisconsin Emergency Management and Federal Emergency Management Agency will not require re-adopting this resolution.

PASSED:_____

Certifying Official

RESOLUTION # 17-001

ADOPTING THE UPDATED RICHLAND COUNTY ALL HAZARDS MITIGATION PLAN

FISCAL IMPACT: None

WHEREAS, the Town of Orion recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save tax payer dollars; and

WHEREAS, an updated All Hazards Mitigation Plan is required by FEMA as a condition of future grant funding for mitigation projects; and

WHEREAS, the Town of Orion participated jointly in the planning process with Richland County and the other local units of government within the County to prepare an updated All Hazards Mitigation Plan, which was made available for review via a Legal Notice and a copy of which will reside permanently in the Richland County Emergency Management Office;

NOW, THEREFORE, BE IT RESOLVED, that the Town Board of the Town of Orion, hereby adopts the updated Richland County All Hazards Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Richland County Emergency Management Department will submit, on behalf of the Town, the updated All Hazards Mitigation Plan to Wisconsin Emergency Management and Federal Emergency Management Agency officials for final review and approval. Minor changes made upon advice from Wisconsin Emergency Management and Federal Emergency Management Agency will not require re-adopting this resolution.

PASSED: 3/21/2017

Ryan J. Miller - Chairman

Certifying Official

RESOLUTION # 1-2017

ADOPTING THE UPDATED RICHLAND COUNTY ALL HAZARDS MITIGATION PLAN

FISCAL IMPACT: None

WHEREAS, the Town of Richland recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save tax payer dollars; and

WHEREAS, an updated All Hazards Mitigation Plan is required by FEMA as a condition of future grant funding for mitigation projects; and

WHEREAS, the Town of Richland participated jointly in the planning process with Richland County and the other local units of government within the County to prepare an updated All Hazards Mitigation Plan, which was made available for review via a Legal Notice and a copy of which will reside permanently in the Richland County Emergency Management Office.

NOW, THEREFORE, BE IT RESOLVED, that the Town Board of the Town of Richland, hereby adopts the updated Richland County All Hazards Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Richland County Emergency Management Department will submit, on behalf of the Town, the updated All Hazards Mitigation Plan to Wisconsin Emergency Management and Federal Emergency Management Agency officials for final review and approval. Minor changes made upon advice from Wisconsin Emergency Management and Federal Emergency Management Agency will not require re-adopting this resolution.

PASSED: 3/08/2017

David Schenk Chairman

Certifying Official

TOWN OF RICHWOOD, RICHLAND COUNTY, WISCONSIN

RESOLUTION # 2017-01

RESOLUTION ADOPTING THE UPDATED RICHLAND COUNTY ALL HAZARDS MITIGATION PLAN

FISCAL IMPACT: None

WHEREAS, the Town of Richwood recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save tax payer dollars; and

WHEREAS, an updated All Hazards Mitigation Plan is required by FEMA as a condition of future grant funding for mitigation projects; and

WHEREAS, the Town of Richwood participated jointly in the planning process with Richland County and the other local units of government within the County to prepare an updated All Hazards Mitigation Plan, which was made available for review via a Legal Notice and a copy of which will reside permanently in the Richland County Emergency Management Office;

NOW THEREFORE, BE IT RESOLVED, that the Town Board of the Town of Richwood, hereby adopts the Updated Richland County All Hazards Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Richland County Emergency Management Department will submit, on behalf of the Town, the updated All Hazards Mitigation Plan to Wisconsin Emergency and Federal Emergency Agency officials for final review and approval. Minor changes made upon advice from Wisconsin Emergency Management and Federal Emergency Management Agency will not require re-adopting this resolution.

PASSED: March 13, 2017 BY A VOTE OF: 4 - 0

Richard W. Zimpel - Chairman

Certifying Official

RESOLUTION # 2017-03-2

ADOPTING THE UPDATED RICHLAND COUNTY ALL HAZARDS MITIGATION PLAN

FISCAL IMPACT: None

WHEREAS, the Town of Rockbridge recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save tax payer dollars; and

WHEREAS, an updated All Hazards Mitigation Plan is required by FEMA as a condition of future grant funding for mitigation projects; and

WHEREAS, the Town of Rockbridge participated jointly in the planning process with Richland County and the other local units of government within the County to prepare an updated All Hazards Mitigation Plan, which was made available for review via a Legal Notice and a copy of which will reside permanently in the Richland County Emergency Management Office

NOW, THEREFORE, BE IT RESOLVED, that the Town Board of the Town of Rockbridge, hereby adopts the updated Richland County All Hazards Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Richland County Emergency Management Department will submit, on behalf of the Town, the updated All Hazards Mitigation Plan to Wisconsin Emergency Management and Federal Emergency Management Agency officials for final review and approval. Minor changes made upon advice from Wisconsin Emergency Management and Federal Emergency Management Agency will not require re-adopting this resolution.

PASSED: 3-16-17

Teresa Collins - Clerk

Certifying Official

RESOLUTION # _____

ADOPTING THE UPDATED RICHLAND COUNTY ALL HAZARDS MITIGATION PLAN

FISCAL IMPACT: None

WHEREAS, the Town of Sylvan recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save tax payer dollars; and

WHEREAS, an updated All Hazards Mitigation Plan is required by FEMA as a condition of future grant funding for mitigation projects; and

WHEREAS, the Town of Sylvan participated jointly in the planning process with Richland County and the other local units of government within the County to prepare an updated All Hazards Mitigation Plan, which was made available for review via a Legal Notice and a copy of which will reside permanently in the Richland County Emergency Management Office;

NOW, THEREFORE, BE IT RESOLVED, that the Town Board of the Town of Sylvan, hereby adopts the updated Richland County All Hazards Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Richland County Emergency Management Department will submit, on behalf of the Town, the updated All Hazards Mitigation Plan to Wisconsin Emergency Management and Federal Emergency Management Agency officials for final review and approval. Minor changes made upon advice from Wisconsin Emergency Management and Federal Emergency Management Agency will not require re-adopting this resolution.

PASSED: March 14, 2017

Patrick Meehan Chairman

Certifying Official

RESOLUTION # 171

ADOPTING THE UPDATED RICHLAND COUNTY ALL HAZARDS MITIGATION PLAN

FISCAL IMPACT: None

WHEREAS, the Town of Westford recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save tax payer dollars; and

WHEREAS, an updated All Hazards Mitigation Plan is required by FEMA as a condition of future grant funding for mitigation projects; and

WHEREAS, the Town of Westford participated jointly in the planning process with Richland County and the other local units of government within the County to prepare an updated All Hazards Mitigation Plan, which was made available for review via a Legal Notice and a copy of which will reside permanently in the Richland County Emergency Management Office;

NOW, THEREFORE, BE IT RESOLVED, that the Town Board of the Town of Westford, hereby adopts the updated Richland County All Hazards Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Richland County Emergency Management Department will submit, on behalf of the Town, the updated All Hazards Mitigation Plan to Wisconsin Emergency Management and Federal Emergency Management Agency officials for final review and approval. Minor changes made upon advice from Wisconsin Emergency Management and Federal Emergency Management Agency will not require re-adopting this resolution.

PASSED: Yes

Certifying Official Clerk

RESOLUTION # 2017-1

ADOPTING THE UPDATED RICHLAND COUNTY ALL HAZARDS MITIGATION PLAN

FISCAL IMPACT: None

WHEREAS, the Town of Willow recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save tax payer dollars; and

WHEREAS, an updated All Hazards Mitigation Plan is required by FEMA as a condition of future grant funding for mitigation projects; and

WHEREAS, the Town of Willow participated jointly in the planning process with Richland County and the other local units of government within the County to prepare an updated All Hazards Mitigation Plan, which was made available for review via a Legal Notice and a copy of which will reside permanently in the Richland County Emergency Management Office;

NOW, THEREFORE, BE IT RESOLVED, that the Town Board of the Town of Willow, hereby adopts the updated Richland County All Hazards Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Richland County Emergency Management Department will submit, on behalf of the Town, the updated All Hazards Mitigation Plan to Wisconsin Emergency Management and Federal Emergency Management Agency officials for final review and approval. Minor changes made upon advice from Wisconsin Emergency Management and Federal Emergency Management Agency will not require re-adopting this resolution.

PASSED 11-3-2017

Certifying Official

Appendix C: Summary of Mitigation Strategies

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
All Hazards	Continue to promote the increased use of National Oceanic and Atmospheric Administration (NOAA) weather radios.	Covered by Dept. annual budget	EM Dept. / ARES-RACES	Ongoing	High	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	The county participates in radio and public relations shows to sell weather radios through a partnership with the local ARES/RACES group. Weather radios are also promoted annually during Tornado Week.
	Upgrade area early warning sirens: • Viola has 2 and needs 1 more.	As funding available $15K	EM Dept. / VI of Viola	2019	Medium – High	VI of Viola	Viola did not get siren, but did install back-up radio link Vernon County dispatch can set off.
	• Sextonville/Gotham, Rock Bridge and Hub City would all like sirens. (Three in total.)	$27K	Sextonville, Gotham, Rock Bridge, Hub City			Sextonville, Gotham, Rock Bridge, Hub City	Funding not available. Carried forward until funding becomes available.
	• VI of Boaz would like to install a siren	$20K per siren	VI of Boaz			VI of Boaz	
	• The county would like to explore	$20K per	EM Dept.		Low	Richland Co; City	Funding not available. Carried

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
	audible warning/talking sirens at campgrounds.	siren				of Richland Center; Villages of Boaz, Cazenovia, Lone Rock, Viola & Yuba; Towns of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	forward until funding becomes available.
	Purchase and install another weather data collection station.	As grants available $1,500	EM Dept.	2019	Low	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	The goals would be to purchase web-enabled devices that could share information with the National Weather Service as well as provide current information to citizens. One would be placed on the ARES tower in the northwest corner/highest point in the county. County would still like one in the NW part of the county.
	Richland County Partnership with Ready Wisconsin AmeriCorps Preparedness Project	Covered by a grant provided by Wisconsin Emergency	EM Dept.	Ongoing as of Sept 2014	High	Richland County, including VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; CI of	Develop preparedness programs within the county; recruit volunteers; conduct preparedness presentations.

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
		Manage-ment				Richland Center; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Sylvan, Willow and Westford.	
	Conduct a cost benefit analysis for installing a next generation / E911 (Nixle) communications system in the county.	As grants available	EM Dept. / Sheriff's Office	Ongoing	Low	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	This communications system would accept texts, etc. in addition to traditional phone calls. As funding becomes available county will make improvements to its PSAP/911 center.
	** Continue to add/update Emergency Management Department links on the existing county web site (e.g., ARC, Homeland Security/FEMA/NFIP, WEM) especially focusing on preparedness bulletins. Publicize the website to show the community what is available.	Covered by Dept. annual budget	EM Dept.	Ongoing	Medium	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle,	The county currently puts warnings online, but would like to expand to include preparedness materials. County plans to add a hazmat tab & LEPC tab in 2015. Will continue to update links as

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
						Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	needed. Will also be adding social media.
	Upgrade the server between Zoning and the Sheriff's Dispatch.	~$8,000	Zoning / Sheriff's Office	2015	High	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	The county installed a new server between Zoning and the Sheriff's Office Dispatch Center to provide better data access for the Spillman program in 2012. The server is now mostly full and a new, larger one is needed. The server will be installed, if funding allows in 2015.
	Bring county school bus companies from UHF to VHF band.	As funding allows	EM Dept. / School Dists. / Bus Companies	2019	Low	Richland County; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge,	• Ithaca, Weston and Kickapoo Districts own buses. Others are private. • Ithaca and Weston have no radios. Ithaca is trying to find budget money to install radios. • Richland Center and Kickapoo are on UHF. Richland Center has declined to participate. • For interoperability during school uses and during disaster, when resource may be used by

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
						Sylvan, Westford and Willow	communities. Funding has not been available.
	Improve daily communication ability and create a redundancies and back-ups within the system. • Purchase and install three repeaters to communication system to increase daily coverage and act as back-up for northern third of county.	As funding allows $115K	EM Dept.	2019 2013-2016	High	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	There was a failure in 2009. The problem was identified in 2010. Funding began in 2011. Project to be completed by 2016 if funding allows.
	Explore options for improving communications in NW corner of Richland County (VI of Viola region).	As funding allows	EM Dept. / Sheriff's Office / VI of Viola	Ongoing	High	Richland County Village of Viola Towns of Forest and Sylvan	The Viola Fire Department covers the VI of Viola, and the TNs of Bloom, Forest, Marshall and Sylvan. As a part of the county's radio upgrade, options to improve communications will continue to be pursued
Drought and Dust Storms	County should be prepared to provide information to farmers during times of drought.	Covered by Dept. annual budget	UW-Ext. / USDA	As needed	Low	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall,	DNR gives assistance and permits for stream pumping for farms.

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
						Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	
	Inform farmers on purchasing crop insurance.	Covered by Dept. annual budget	UW-Ext. / USDA	Ongoing	Low	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	Materials available and provided in Public Service Announcements.
Fires: Forest and Wildfires	Continue to provide outreach efforts to homeowners on protecting homes and structures from wildfires.	Costs vary	Local Fire Departments	Ongoing	Low	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford	Completed annually during Fire Safety Week in Sept. or Oct.

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
						and Willow	
	Provide ample training for volunteer fire fighters for larger fires.	Costs vary	Local Fire Departments / EM Dept.	Ongoing	Medium	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	The WI DNR provides annual training (March) on prairie fires where they do a controlled burn (on rotation). There is a DNR satellite office in Richland Center and the main office (w/heavy equip) is in Spring Green. Orion is the most wooded area in the county and it plus the other 3 listed towns have a cover of pine, locusts, oak in a sandy soil.
Flooding and Dam Failure	** Review and update links on the EM Dept. website as necessary for flood preparedness material and monitoring of the ground water level at the Koch well. This well is a fairly reliable predictor of local flooding.	Covered by Dept. annual budget	EM Dept.	Ongoing	Medium	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	
	Upgrade roadways to prevent future flooding damage:	As funding allows	EM Dept. / HWY Dept. / Sheriff's Office	Ongoing	Medium	Richland County; CI of Richland Center; VIs of	

Summary of Mitigation Strategies							
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	• Highway 80 – flooding caused the K-rails to float into the road requiring replacement. Road needs improved drainage. This is a main N/S trunk road (along w/ Hwy 14).				Medium	Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	As funding allows. Some drainage work has been completed on the eastern edge of Hwy 80, north of Hwy 193. Carried forward and will be completed as funding allows.
	• CTH JJ from STH 14 to the Sauk County line – improve drainage to keep water off of the road.				Medium		
	• Redo 4 miles of County Hwy TB – change grade, elevation, paved shoulders where prone to flood damage, add culverts and upsize current culverts			2016	High	Town of Orion	
	• County Highways A, H, OO, Q and Z – pave shoulders prone to flood damage, redo ditch to promote correct drainage and add culverts where appropriate – as funding allows.				High	Towns of Buena Vista, Bloom, Dayton, Marshall and Orion	
	• Town Road Twin Bluffs Rd. – elevate section of road, re-pave shoulders prone to flood damage,				High	Town of Buena Vista	

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
	redo ditches to improve drainage. – as funding allows.						
	** Continue increasing the county's GIS mapping capabilities which are used for vital purposes such as emergency planning and response, government decision-making and sound land use policy development.	Cost to be Determined	LIO	As funding available	Medium	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	Main projects are updating the FIRM panels and keeping data current. Also plan to set lot corners so that parcels are more correct.
	** Explore the feasibility of purchasing and installing flood gauges: • Pine River – buy 1 and upgrade 2 • Mill Creek – buy 2	Purchase $12K / Upgrade $4K	EM Dept. / Zoning	As funding available	Very High	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	Potential of partnering with the NWS and USGS to install gauges in the Villages of Boaz and Yuba and in the City of Richland Center Received CDBG funds, but contractor was unable to complete project. Money was reallocated to move community center from floodplain. Project was carried forward.
	** Work with FEMA to complete the requirements to become compliant	Covered by Dept.	VI of Cazenovia with	2009	High	VI of Cazenovia	EM Dept. is continuing to work with the VI of Cazenovia.

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
	with the National Flood Insurance Program (NFIP).	annual budget	support from EM Dept.				
	Explore options to reduce/eliminate flooding risk at the Yuba Fire Department facility.	Unknown	Yuba Fire Dept., VI of Yuba	2019	Medium	VI of Yuba	This critical infrastructure is on the Pine River and is subject to flooding. It needs to be rebuilt unless the local mill goes out of business, at which time Yuba will unincorporated.
	** Explore options for Buyouts/Elevations: ▪ Look for options for one private rental property in Richland Center. ▪ Explore elevating 10-15 homes along Wisconsin Street in the VI of Viola. ▪ Property owner in VI of Viola is interested in buyout. • WEM hazmit has identified an RLP in TN of Eagle.	Covered by Dept. annual budget $64K WEM Hazmit $150k	Zoning and EM Dept.	2019	High High High High	Richland County CI of Richland Center VI of Viola TN of Eagle	FEMA's PDM & FMA grants are potential funding sources for buyout. Property has yet to receive funding. Carried forward and will continue to look for options. No funding available. Carried forward and will look to complete once funding becomes available. Did not receive CBA funds in 2011 or 2014. Two additional property owners are not currently interested. Will continue to work with township to secure support and funding.
	** Provide information to citizens about the purchase of flood insurance.	Covered by Dept. annual budget	EM Dept.	Ongoing	Medium	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle,	Continue to provide information and make available on the website.

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
						Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	
	Train and exercise on the plans for the five county-owned dams.	Covered by Dept. annual budget	EM and Land Conservation	Ongoing	Medium	Richland County; VI of Boaz; TNs of Akan, Dayton, Sylvan,	County completed review of the five county-owned dams and integrated the information into the EOP.
	Insert a ditch with control system to control flash flooding.	As grant funding available	EM Depts. of Richland, Iowa and Sauk Counties / Tri County Airport	Ongoing	Medium	Richland, Iowa and Sauk Counties; VI of Lone Rock; TNs of Buena Vista and Spring Green	Drainage district was created. Lone Rock ground water study done 2011-2012. Training completed in 2013.
Fog	Provide public information via website links or brochures regarding safe driving procedures in the fog.	Covered by Dept. annual budget	EM Dept.	Ongoing	Low	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	The Sheriff's Office does PSAs on radio (WRCO 100.9 FM and 1450 AM) annually.
Landslide	Examine areas where landslides occur and determine if any mitigation	Covered by annual	TNs of Akan, Buena Vista,	Ongoing	Medium	Towns of Akan, Buena Vista,	Due to cutting roadways into the hills, water rushes through and

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
	measures (signs, retaining walls, lighting, etc.) may be necessary for public safety.	budgets	Eagle, Forest and Orion / HWY Dept. / Sheriff's Office / EM Dept.			Bloom, Eagle, Forest, Henrietta and Orion	erodes debris onto the roads.
Severe Temperatures	Continue public informational campaigns about severe weather on the website and during Winter and Heat Awareness Weeks.	Covered by Dept. annual budget	EM Dept. / PH	Ongoing	Medium	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	Completed in annual campaigns in Fall and Spring. The EM and Public Health Depts. also do PSAs on radio (WRCO 100.9 FM and 1450 AM) when needed.
Storms: Hail	Place hail storm safety materials in county display rack, on the website and during severe weather week.	Covered by Dept. annual budget	EM Dept.	Ongoing	Medium	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford	Completed annually as needed.

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
						and Willow	
	Provide information regarding the purchase of crop insurance.	Covered by Dept. annual budget	UW Ext. / FSA	Ongoing	Low	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	County farmers lost 85% of the apple crop in a hailstorm in June 2008.
Storms: Lightning	Place lightning safety materials in county display rack, on the website and during severe weather week.	Covered by Dept. annual budget	EM Dept.	Ongoing	Medium	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	Completed annually as needed.
Storms: Thunderstorm	Place thunderstorm safety materials in county display rack, on the website and during severe weather week.	Covered by Dept. annual	EM Dept.	Ongoing	Medium	Richland County; CI of Richland Center; VIs of	Completed annually as needed.

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
		budget				Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	
	Provide advice to event boards, the UW campus and residences for senior citizens seeking assistance regarding safety issues.	Covered by Dept. annual budget	EM Dept. / LE	Ongoing	Low	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	Fair, State High School Rodeo – can have 15,000-20,000 people. Provide radio PSAs to whole community on WRCO 100.9 FM and 1450 AM. In cooperation with UW- Richland County, K-12 School Districts complete safety Awareness program annually.
Storms: Tornadoes and High Winds	Provide information (via website link) to mobile home park owners and park/campground operators about providing permanent storm shelters in the parks. Each shelter holds approximately 10 people and costs $3,000. Provide information of	Costs vary	EM Dept.	Ongoing	Medium	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom,	• Mobile home parks in City of Richland Center and Villages of Lone Rock, Sextonville and Viola and the Town of Rockbridge. • Campgrounds are Alma

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
	tornado risk based on NWS-provided risk bands.					Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	Springs, the Flying J and Eagle Cave. (Eagle Cave is in the County's NWS-identified "tornado alley." • Utilize Department of Commerce's CDBG for funding assistance when available. • Will continue to provide information and support as requested. VI of Lone Rock is considering a shelter for River Rock Trailer Park, Trailer Park along US Hwy 14 and K-6 school. VI of Cazenovia is considering a shelter.
	Explore the feasibility of increasing the wind resistance of the roofs of community storm shelters.	Covered by Dept. annual budget	EM Dept.	As grants available	Medium	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	Will continue as interest from community is brought forward and as funding is available.
	Explore the feasibility of hardening	Village of	Administration	Grant or	Medium	Village of Lone	School is a shelter for the children

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
	the Lone Rock Elementary School (K-5) structure to withstand greater stress from winds or to creating an adjacent tornado shelter.	Lone Rock	and School Board	budgetary funding, as available		Rock	and is a resource for the wider community.
	Promote tornado awareness, including safety measures.	Covered by Dept. annual budget	EM Dept.	Ongoing	Medium	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	• Completed annually during Tornado Awareness Week in April and by sponsoring spotter classes. Information will be included on the website for homes, schools and business safety measures. • NWS La Crosse provides a tornado packet that includes a county map with a vulnerability analysis.
Storms: Winter	Promote winter hazards awareness, including home and travel safety measures (including website.)	Covered by Dept. annual budget	EM Dept.	Ongoing	Medium	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	Completed annually during Winter Weather Awareness Week in November. The Sheriff's Office also does PSAs on radio (WRCO 100.9 FM and 1450 AM) when needed. Information is available on the EM website, in the local newspaper (The Observer) and at the county fair.

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
Utility Failure	Complete a feasibility study (with cost-benefit analysis) to selectively upgrade shelter facilities for electricity needs.	Covered by Dept. annual budget	EM Dept.	Ongoing	Medium	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	The middle school in Richland Center is a shelter but it has no generator. The high school might be upgraded. Need to also evaluate the status of the electricity in the shelters in Lone Rock and Viola.
	Complete electrical improvement projects to: • Install a loop feed system into the North Industrial park. • Upgrading Olson substation because it is at the end of its life-span	As funding allows. $250k $1.6M	City Utilities of Richland Center - Electric	2019 2019	High High	CI of Richland Center	This is one of two substations that power Richland Center. If the substation fails in a storm, electrical power would be disrupted. This would disrupt business, homes and if it happened during a period of extreme temperatures, could cause injuries and/or deaths.
	There are six lift-station locations, none of which have generator back-up. The city would like to install two permanent generators and to have four, trailer-mounted portable generators to address this need.	As grant funding allows. $35-40K/unit for permanent generators and	CI of Richland Center - Wastewater Treatment	2019	High	City of Richland Center	

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
		$90K for portable generators					
	Explore improving the electrical power delivery system to provide an underground link to a second substation as a back-up for the Richland Hospital and its neighborhood.	$150,000 (as grant funding allows)	City of Richland Center Electric	2019	Very High	City of Richland Center	The hospital is critical infrastructure – the only hospital, which is a Level IV Trauma Center, in the area. The hospital has a back-up generator but it only powers limited functions (e.g., surgeries are halted). There are two power links but both go to the same substation.
	Replace overhead primary electrical lines with underground lines, as identified.	As funding allows	Richland Electric Co-Op	Ongoing	High	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	
Hazardous Materials	Train First Responders on proper methods and techniques of minimizing impacts to people and property when a hazardous material is released	$5K Covered by HMEP Grant	EM Dept.	Ongoing	Medium	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista,	Part of an annual ongoing and expanding effort to protect people and property from technological hazards.

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
						Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	

ARC = American Red Cross
ARES = Amateur Radio Emergency Services
DNR = Wisconsin Department of Natural Resources
DOT = Department of Transportation
EM Dept = Richland County Emergency Management Department
EOC = Emergency Operations Center
EOP = Emergency Operating Procedure
FEMA = Federal Emergency Management Agency
FSA = Farm Service Agency
GIS = Geographic Information System
LE = Law Enforcement
LIO = Land Information Office
NFIP = National Flood Insurance Program
NOAA = National Oceanic and Atmospheric Administration
NWS = National Weather Service
PSA = Public Service Announcement
RACES = Radio Amateur Civil Emergency Service
RLP = Repetitive Loss Property
USDA = U.S. Department of Agriculture
USGS = U.S. Geological Survey
UW Ext = University of Wisconsin – Richland County Extension Office
WEM = Wisconsin Emergency Management

** National Flood Insurance Program (NFIP) compliance elements

Appendix D: Report on Previous Plan Mitigation Strategies

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
All Hazards	Continue to promote the increased use of National Oceanic and Atmospheric Administration (NOAA) weather radios.	Covered by Dept. annual budget	EM Dept. / ARES-RACES / Sheriff's Office / Fire Depts.	Aug 08 – Dec 09	High	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	Received a disabled/hearing impaired external antenna at cost. They do radio and public relations shows to sell weather radios through the fire stations. The county had drawings at the fair annually and at Radio Days in June. In September, the county partnered with Walmart, Town & Country TV & Appliance and Walsh's Ace Hardware to sell weather radios. Weather radios are also promoted annually during Tornado Week.
	Upgrade area early warning sirens: • Richland Center has 4 and they need two more. • Viola has 2 and needs 1 more. • Sextonville/Gotham, Rock Bridge and Hub City would all like sirens.	As funding available $18K total $3K $27K	EM Dept. / CI of Richland Center VI of Viola Sextonville, Gotham, Rock Bridge, Hub City	2014	Medium – High	 CI of Richland Center VI of Viola Sextonville, Gotham, Rock Bridge, Hub City	 Richland Center received two sirens. Viola did not get a third siren, but did install back-up radio link that Vernon County dispatch can set off. Funding not available. Carried forward.

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
	• Lone Rock and Cazenovia each have a siren that has to be activated by a person pushing an on-site button for 15 seconds. They would like to tie the activation of these sirens into dispatch.	$7K total for both sirens	VIs of Lone Rock and Cazenovia / Sheriff's Office			Vis of Lone Rock and Cazenovia	Upgrade completed on both sirens. Richland County can activate sirens as well as the villages.
	• The county would like to explore audible warning/talking sirens at campgrounds.	$20K for each siren	EM Dept.		Low	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	Funding not available. Carried forward.
	Purchase and install three weather data collection stations.	As grants available $1,250 total	EM Dept.	On-going	Low	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta,	The goals were to purchase web-enabled devices that could share information with the National Weather Service as well as provide current information to citizens. One would be placed on the ARES tower in the northwest corner/highest point in the county. One weather data collection station was installed at the WRCO Tower.

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
						Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	
	Continue working with and supporting the county volunteer teams.	Covered by Dept. annual budget	EM Dept.	On-going	Low	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	Work with Alert Cadet (a father/sons group) that takes SFA, CPR, ICS and chainsaw safety training. They volunteered to do firewood and snow removal for mobile homes in Winter 2007 as well as helping residents in both flood incidents. Disbanded in 2012.
	Conduct a cost benefit analysis for installing a Reverse 9-1-1 communications system in the county.	As grants available	EM Dept. / Sheriff's Office	On-going	Low	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland,	The project was reviewed and determined to be cost-prohibitive at this point in time. Staff will continue to monitor to see if it becomes feasible. As of 2013, project is still cost prohibitive. Therefore, money will be focused on E911 (Nixle).

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
						Richwood, Rockbridge, Sylvan, Westford and Willow	
	**Continue to add/update Emergency Management Department links on the existing county web site (e.g., ARC, Homeland Security/FEMA/NFIP, WEM) especially focusing on preparedness bulletins. Publicize the website to show the community what is there.	Covered by Dept. annual budget	EM Dept	On-going	Medium	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	The county currently puts warnings online, but would like to expand to include preparedness materials. Webpage developed and live in 2012. County plans to add a hazmat tab. Will continue to update links as needed. Will also be adding social media.
	Provide the capability for the 9-1-1 Center to locate emergency calls coming in from cellular telephones.	PSC grant received for $347K	Sheriff's Office / LIO (GIS)	2009	High	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge,	Project was completed in January, tested and went live in April, 2009 ahead of its 2010 scheduled date. County is looking for additional grants to increase system effectiveness.

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
						Sylvan, Westford and Willow	
	Bring county school bus companies from UHF to VHF band.	As funding allows	EM Dept. / School Dists. / Bus Companies	2012	Low	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	• Ithaca, Weston and Kickapoo Districts own buses. Others are private. • Ithaca and Weston have no radios. Ithaca is trying to find budget money to install radios. • Richland Center and Kickapoo are on UHF. Richland Center has declined to participate. • For interoperability during school uses and during disaster, when resource may be used by communities. Funding has not been available.
	Find an alternate location for WRCO (FM & AM) radio station. This privately-owned station is the main emergency communications mode with the public in Richland Co during a disaster.	CDBG $390K / CI & CO funds / Private loans	EM Dept. / CI of Richland Center	2012	High	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	• Radio station can be operated from the EOC due to an equipment upgrade in 2008. • Station personnel were removed from the station in a boat during a flood. • An application went in for this project under the 2008 flood mitigation project money. The city's 12.5% share is $60K. • The FM transmitter and the rest of the operation was moved to a new building. The AM transmitter remained, but was moved and reinforced by the lift station. The AM antennae is in the same

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
							location and would have to be turned off if flooded. The old site is green space.
	Improve interoperable communications capability in the county dispatch center.	Grant received	Sheriff's Office	2008 2011-12 2015	High	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	• ROIP (Radio over Internet Protocol) and Spillman were installed in dispatch in March 2009. • Consoles were upgraded in dispatch with a 2005 grant. WISCOM unit was installed in dispatch. IFERN repeater for MABAS will be installed in dispatch in 2015.
	Improve field (IC) interoperable communications capability during a disaster.	Covered by Dept. annual budget	EM Dept.	2010	Medium	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford	The county would like to create a communications plan that could be used to parse channels in an emergency. Technical Interoperable Communications Plan completed.

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
						and Willow	
	Improve communications capabilities in the County Emergency Operations Center (EOC).	As funding allows	EM Dept.	2008-2012	High	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	County has an annual project: ▪ '05 – amateur radio and generator back-up ▪ '06 – satellite phone ▪ '07 – IT upgrade ▪ '08 – projector and wireless internet; Davis weather station and amateur radio upgrades ▪ '09 – paging base station ▪ '11 – WISCOM radio added
	Improve daily communication ability and create a redundancies and back-ups within the system. • Install generator at Tower. • Replace repeater (P-25 capable). • Install primary page repeater and attach generator back-up. • Establish ability for dispatch to monitor Tower Hill tower site. • Relocate MARC and IFERN to WRCO tower.	As funding allows $21K $30K $51K $5K $<5K	EM Dept.	2008-2012 2010 2011 2011 2011-2012 2013	High	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	There was a failure in 2009. The problem was identified in 2010. Funding began in 2011. Tower site is the busiest. Dispatch monitors Tower Hill (primary) tower site via webcam and sensors.
	The county is installing a new server	**$<240K**	Zoning /	2009	High	Richland County;	Project completed 2012.

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
	between Zoning and the Sheriff's Office Dispatch Center to provide better data access.		Sheriff's Office			CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	
	The radio communication system owned and used by the VI of Viola is not reliable primarily due to terrain issues. The county and the Village would like to upgrade or relocate the tower to provide more reliable access.	~$30K as grant funding is received	EM Dept. / VI of Viola	2014	Medium	Richland County Village of Viola Towns of Bloom, Forest, Marshall, Sylvan	The Viola Fire Department covers the VI of Viola, and the TNs of Bloom, Forest, Marshall, and Sylvan. Not completed. Funds not available and they now have better coverage since Vernon upgraded Liberty Tower. Although, issues on the eastern edge of the district (NW corner of Richland County) still exist. Carried forward.
Drought and Dust Storms	Provide a link on the county disaster preparedness website to the National Weather Service – La Crosse drought index.	Covered by Dept. annual budget	EM Dept.	2009	Medium	Richland County; CI of Richland Center; Vis of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom,	DNR gives assistance and permits for stream pumping for farms. Completed 2013.

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
						Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	
	County should be prepared to provide information to farmers during times of drought.	Covered by Dept. annual budget	UW-Ext. / USDA	As needed	Low	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	DNR gives assistance and permits for stream pumping for farms. During the 2012 drought, water conservation announcements were made.
	Inform farmers on purchasing crop insurance.	Covered by Dept. annual budget	UW-Ext. / USDA	Ongoing	Low	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle,	Materials available and provided in Public Service Announcements.

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
						Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	
Fires: Forest and Wildfires	Continue to provide outreach efforts to homeowners on protecting homes and structures from wildfires.	Costs vary	Local Fire Departments	Ongoing	Low	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	Completed annually during Fire Safety Week in Sept. or Oct.
	Provide ample training for volunteer fire fighters for larger fires.	Costs vary	Local Fire Departments / EM Dept.	Ongoing	Medium	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall,	The WI DNR provides annual training (March) on prairie fires where they do a controlled burn (on rotation). Blue River hosted in 2013. VI of Cazenovia hosts in 2014. There is a DNR satellite office in Richland Center and the main office (w/heavy equip) is in Spring Green. Orion is the most wooded area in the county and it plus the other 3 listed towns have a cover of pine,

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
						Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	locusts, oak in a sandy soil.
Flooding and Dam Failure	**Place a link on the EM Dept. website for flood preparedness material and one that will show the monitoring of the ground water level at the Koch well. This well is a fairly reliable predictor of local flooding.	Covered by Dept. annual budget	EM Dept.	2009	Medium	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	http://groundwaterwatch.usgs.gov/AWLSites.asp?S=431840090203201&ncd= Website with link completed 2013.
	Upgrade roadways to prevent future flooding damage: • Highway 80 – flooding caused the K-rails to float into the road requiring replacement. Road needs improved drainage. This is a main N/S trunk road (along w/ Hwy 14).	As funding allows	EM Dept. / HWY Dept. / Sheriff's Office	Ongoing	Medium Low	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood,	As funding allows. Some drainage work has been completed on the eastern edge of Hwy 80, north of Hwy 193. Carried forward.

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
						Rockbridge, Sylvan, Westford and Willow	
	• Hwy 131 & Chadwick Hollow Rd – This road needs to be widened, needs its banks stabilized and needs a bigger culvert at the lower end. Chadwick Hollow Rd is the only road that will provide access to Viola during flooding (30-45 days in 2008 floods). The road starts in Vernon Co but that part has no problems.		VI of Viola		Very High		Project completed 2013.
	• County Y is prone to flood damage but it does not provide the only access to any areas.				Low		Project to be carried over and will be completed as funding becomes available.
	• The Town of Akan roads are built in bad terrain. Rains cause about 34 miles of roads to be covered in mud, which requires scraping by the Town.		TN of Akan		Medium		Town of Akan wishes to carry the project forward and complete as funding becomes available. FEMA has provided some funding and assistance with this project.
	• CTH AA between STH 80 and CTH SR – pave shoulders of overflow areas to prevent damage to the rest of the road during flooding.						Project completed 2011
	• CTH SR east of STH 80 – Raise a 300' section & add 1-2 drainage pipes to keep water off road.						Project completed 2011
	• CTH D west of STH 80 – pave shoulders or overflow areas to						

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
	prevent damage to the road. • CTH JJ from STH 14 to the Sauk County line – improve drainage to keep water off of the road. • CTH F south of CTH U – the overflow is in very bad shape and needs to be repaved.						Project completed 2010 Project carried over Project completed 2010
	** Continue increasing the county's GIS mapping capabilities. Digital orthophotography is used throughout Wisconsin for vital purposes such as emergency planning and response, government decision-making and sound land use policy development. • Upgrade LIDAR.	Cost to be Determined $237K	LIO	As funding available 2009-2010	Medium	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	Current county floodplain maps are on the website as of 2008. The county has aerial photos that were completed in '05 as part of a multi-county consortium. The Wisconsin Regional Orthophotography Consortium (WROC) is forming to build a multi-participant program to acquire digital orthoimagery (2' intervals) and elevation data throughout Wisconsin in 2010.
	** Explore the feasibility of purchasing and installing flood gauges: • Pine River – buy 1 and upgrade 2 • Mill Creek – buy 2	Purchase $12K / Upgrade $4K	EM Dept. / Zoning	As funding available	Very High	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta,	Potential of partnering with the NWS and USGS to install gauges. Carry forward the project of installing flood gauges for the Villages of Yuba and Boaz and the City of Richland Center. Received CDBG funds but contractor was unable to complete project. Money was reallocated to move community center from

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
						Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	floodplain.
	Relocate community center out of floodplain.	CDBG $32K $1.7M total	EM Dept. / Zoning	2012	Very High	CI Richland Center	Old structure was razed and new structure was built. New building functions partially as shelter. Reallocated funds from CDBG grant were used to fund project along with funds for gauges.
	** Adopt updated flooding ordinances required by the WI DNR.	Covered by Dept. annual budget	Zoning	2008	High	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	State mandate to re-adopt and the paperwork is at the DNR awaiting approval. CI of Richland Center updated in 2008. Completed in 2009 by the Richland County Board.
	** Work with FEMA to complete the requirements to become compliant with the National Flood Insurance Program (NFIP).	Covered by Dept. annual budget	VI of Cazenovia with support from EM Dept.	2009	High	VI of Cazenovia	**EM Dept. worked with the VI of Cazenovia.**
	** Explore options for	Covered by	Zoning /	Closed on	High	Richland County	FEMA's PDM & FMA grants are

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
	Buyouts/Elevations: ▪ Work with 2 RLP property owners on buy-outs with CDBG grant funding.	Dept. annual budget	EM Dept.	12/30/08			potential funding sources for buyout. Completed – bought out.
	▪ Secure funding, relocate and demo WRCO, the Community Center and 5 private properties in Richland Center.			2014	High	CI of Richland Center	Relocation of WRCO completed. WEM mitigation assisted in one buyout (2012) and an additional buyout has recently been funded (2014). CDBG funds elevated two structures. One rental property has yet to receive funding. Carried forward and will continue to look for options.
	▪ Monitor 3-4 properties in Richland Center that are on the periphery of major flooding hazard areas.						Two properties were elevated and two were bought-out. Completed. No requests brought forward.
	▪ Assist, as requested and able, with the Richland Center business doing flood mitigation improvements.						
	▪ Explore elevating 10-15 homes along Wisconsin Street in the Village of Viola.			2014	High	VI of Viola	No funding available. Carried forward.
	▪ Buyout and demolition of a bowling alley in the VI of Viola. Returned to green space.	CDBG $45K		2011			Completed in 2012?
	** Provide information to citizens about the purchase of flood insurance.	Covered by Dept. annual	EM Dept.	Ongoing	Medium	Richland County; CI of Richland Center; VIs of	Link now available on the website.

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
		budget				Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	
	** Review and update preparedness measures (plans, training, exercising, public information) regarding county dams.	Cost to be determined based on project needs	EM Dept. / Zoning	Ongoing	Medium	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	The county completed a dam shadow plan on 5 dams and all but one ordinance was updated. The EOP was also updated to reflect the new information.
	**** Install shut-offs in lateral sewer lines in the VI of Viola to keep water from flooding 20-30 properties.**	**$400+K**	EM Dept. / VI of Viola	**2009-2011**	Very High	VI of Viola	Installing valves would affect ~100 structures, which house many senior citizens and small, local businesses.
	** Complete floodplain zoning on all		DNR / EM	As funding	Medium	Richland County;	Projects completed.

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
	dams listed below. Also complete dam upgrade projects, as listed: ▪ **Mill Creek #1B- "Huth Dam" -** No dwellings within dam failure shadow. ▪ **Mill Creek #13A- "Luttig Dam"** 1 dwelling within dam failure shadow. Dam needs upgrading to principle and emergency spillways for significant or high hazard dam. Principle spillway is not capable of passing the flow required as defined by NR 333, for a significant or high hazard dam. Dam is not capable of passing the total flow required for a significant or high hazard dam through a combination of the principle and emergency spillways. ▪ **Mill Creek #13B- "Durst Dam" "Brown Dam"** - 1 dwelling within dam failure shadow. ▪ **Mill Creek #3- "Ewers Dam"** - Not capable of passing flow through principle and auxiliary spillway for a high hazard dam. Capable of passing flows of low hazards. No dwellings with dam failure shadow. ▪ **Mill Creek #9A- "Brindley**	Unknown **13A & 13B** DNR Criteria = $721,000.00 + cost of engineer NRCS Low Hazard + Flood Proofing = $393,000.00 NRCS High Hazard = $2,003,000.00 Unknown Unknown	Dept.	available		CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
	Dam" - Principle spillway is not capable of passing flow required for a high or significant hazard dam. Emergency and principle spillway together may not be capable of passing high hazard flows. Dam is capable of passing a significant hazard flow through a combination of auxiliary and principle spillways. ▪ **Mill Creek #10- "Dosch Dam"** ▪ **Mill Creek #6- "Robbins Dam"** - 6 dwellings in dam failure shadow. The dam is not capable of safely passing the flow for a high hazard dam. Needs upgrading. ▪ **Mill Creek #22- "Popp Dam" -** 5 dwellings with dam failure shadow. Dam is not capable of safely passing the flow required for a high hazard dam. The principle spillway is not capable of passing the entire 100 year flood without water flowing over the auxiliary spillway. 1000 year flood would overtop the dam. Dam needs upgrading.	Unknown **6 & 22** DNR Criteria = $677,000.00 + cost of engineer NRCS Low Hazard + Flood Proofing = $821,000.00 NRCS High Hazard = $1,450,000.00					
	Raise the interceptor so that flood waters will not inundate the new 6" wastewater pump.	~$2,500 - $3K to raise the manhole	VI of Viola	2009-2011	Very High	VI of Viola	Completed with CDBG-EAP funds following the 2008 Flood.
	** Continue to work with and support	Covered by	EM Dept. /	Ongoing	High	Richland County;	• Jan '09 – Towns Association met

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
	the DNR as they provide education to the municipalities regarding restrictions on development/road work in flood plains.	Dept. annual budget	Zoning / Municipalities			CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	and distributed floodplain maps for each town • DNR is holding regional meetings with FEMA, Richland Co., WI DOT, WI Counties Association and the WI Towns Association regarding road construction in floodplains. • DNR representative will attend town association meetings in 2014.
	Create a drainage district. Insert a ditch with control system to control flash flooding.	As grant funding available	EM Depts. of Richland, Iowa and Sauk Counties / Tri County Airport	Ongoing	Medium	Richland, Iowa and Sauk Counties; VI of Lone Rock; TNs of Buena Vista and Spring Green	Lone Rock ground water study done 2011-2012. Training completed in 2013. Carry project forward and complete once funding comes available
Fog	Provide public information via website links or brochures regarding safe driving procedures in the fog.	Covered by Dept. annual budget	EM Dept.	Ongoing	Low	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland,	The Sheriff's Office does PSAs on radio (WRCO 100.9 FM and 1450 AM) annually.

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
						Richwood, Rockbridge, Sylvan, Westford and Willow	
Landslide	Examine areas where landslides occur and determine if any mitigation measures (signs, retaining walls, lighting, etc.) may be necessary for public safety.	Covered by annual budgets	TNs of Akan, Buena Vista, Eagle, Forest and Orion / HWY Dept. / Sheriff's Office / EM Dept.	Initial exam by 2010. Ongoing afterward.	Medium	Towns of Akan, Buena Vista, Eagle, Forest and Orion	Due to cutting roadways into the hills, water rushes through and erodes debris onto the roads.
Severe Temperatures	Continue public informational campaigns about severe weather on the website and during Winter and Heat Awareness Weeks.	Covered by Dept. annual budget	EM Dept. / PH	Ongoing	Medium	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	Completed in annual campaigns in Fall and Spring. The EM and Public Health Depts. also do PSAs on radio (WRCO 100.9 FM and 1450 AM) when needed.
Storms: Hail	Place hail storm safety materials in county display rack, on the website and during severe weather week.	Covered by Dept. annual budget	EM Dept.	Ongoing	Medium	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom,	Completed annually as needed.

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
						Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	
	Provide information regarding the purchase of crop insurance.	Covered by Dept. annual budget	UW Ext. / FSA	Ongoing	Low	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	County farmers lost 85% of the apple crop in a hailstorm in June 2008.
Storms: Lightning	Place lightning safety materials in county display rack, on the website and during severe weather week.	Covered by Dept. annual budget	EM Dept.	Ongoing	Medium	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle,	Completed annually as needed.

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
						Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	
	Provide information regarding the use of fire-resistant materials and surge protectors via a website link.	Covered by Dept. annual budget	EM Dept.	Ongoing	Low	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	Completed.
Storms: Thunderstorm	Place thunderstorm safety materials in county display rack, on the website and during severe weather week.	Covered by Dept. annual budget	EM Dept.	Ongoing	Medium	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall,	Completed annually as needed.

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
						Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	
	Provide advice to event boards, the UW campus and residences for senior citizens seeking assistance regarding safety issues.	Covered by Dept. annual budget	EM Dept. / LE	Ongoing	Low	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	Star-Spangled Celebration, Fair, State High School Rodeo – can have 15,000-20,000 people. Co received a letter of commendation for weather monitoring during Star-Spangled Celebration. Provide radio PSAs to whole community on WRCO 100.9 FM and 1450 AM. In cooperation with UW- Richland County, K-12 School Districts completed Safety Awareness program in 2012.
Storms: Tornadoes and High Winds	Provide information (via website link) to mobile home park owners and park/campground operators about providing permanent storm shelters in the parks. Each shelter holds approximately 10 people and costs $3,000. Provide information of tornado risk based on NWS-provided risk bands.	Costs vary	EM Dept.	Ongoing	Medium	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood,	• Mobile home parks in City of Richland Center and Villages of Lone Rock, Sextonville and Viola and the Town of Rockbridge. • Campgrounds are Alma Springs, the Flying J and Eagle Cave. (Eagle Cave is in the County's NWS-identified "tornado alley." • Utilize Department of Commerce's CDBG for funding assistance. Provided information.

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
						Rockbridge, Sylvan, Westford and Willow	VI of Lone Rock is considering a shelter for River Rock Trailer Park and K-6 school.
	Provide information (via website link) to builders and owners of manufactured and mobile homes about the use of tie-downs with ground anchors.	Covered by Dept. annual budget	EM Dept.	Ongoing	Medium	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	Provided information.
	Explore the feasibility of increasing the wind resistance of the roofs of community storm shelters.	Covered by Dept. annual budget	EM Dept.	As grants available	Medium	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge,	Explored Lone Rock School with Fire Department engineer to check shelter strength. Lone Rock expressed desire to build 3 tornado shelters – 1 for the Elementary School and one for each of the mobile home parks located in the Village. Carry project forward and complete once funding becomes available

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
						Sylvan, Westford and Willow	
	Promote tornado awareness, including safety measures.	Covered by Dept. annual budget	EM Dept.	Ongoing	Medium	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	• Completed annually during Tornado Awareness Week in April and by sponsoring spotter classes. Information will be included on the website for homes, schools and business safety measures. • NWS La Crosse provides a tornado packet that includes a county map with a vulnerability analysis.
Storms: Winter	Promote winter hazards awareness, including home and travel safety measures (including website.)	Covered by Dept. annual budget	EM Dept.	Ongoing	Medium	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	Completed annually during Winter Weather Awareness Week in November. The Sheriff's Office also does PSAs on radio (WRCO 100.9 FM and 1450 AM) when needed. Information is available on the EM website, in the local newspaper (The Observer) and at the county fair.

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
Utility Failure	Complete a feasibility study (with cost-benefit analysis) to selectively upgrade shelter facilities for electricity needs.	Covered by Dept. annual budget	EM Dept.	Ongoing	Medium	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	The middle school in Richland Center is a shelter but it has no generator. The high school might be upgraded. Need to also evaluate the status of the electricity in the shelters in Lone Rock and Viola. Funding not currently available. Carried forward. In Oct. 2013, the CI of Richland Center Electrical Utility completed a feasibility study for a 5-year plan for system upgrades.
	Three electrical improvement projects: • Provide a loop electric feed for a circuit on the east end of the City of Richland Center. • Install a loop feed system into the North Industrial park. • Build several small pieces of line as back-ups.	As funding allows. $400K for whole project	City Utilities of Richland Center - Electric	2014	High	CI of Richland Center	The east end loop feed is installed and will be brought online in summer 2014. Completed all of the small line pieces by the UW Richland Center. Funding not currently available for the Industrial Park loop; carried forward.
	There are six lift-station locations, none of which have generator back-up. The city would like to install two permanent generators and to have four, trailer-mounted portable generators to address this need.	As grant funding allows. $35-40K/unit for permanent generators and $90K for	CI of Richland Center - Wastewater Treatment	2014	High	CI of Richland Center	Funding not currently available. Carried forward.

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
		portable generators					
	Purchase and install permanent, 2500KW back-up generators to raise the bay doors so that the heavy equipment can get out in a disaster. Needed at the Highway Shop and at the Richland Electric Co-Op Service Center	$55K total	HWY Dept. / Richland Electric Co-op	2014	Medium	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	Richland County Public Health Building and Highway Shop purchased generators in 2011, $55,000 for both.
	Replace overhead primary electrical lines with underground lines. • Project 2751.52.53 – 5.22 miles of SW Richland Co (Upper Byrds Creek from junction of CTH X). • Proj. 2756.57 – 1.88 mi in SW Richland Co (Middle Byrds Creek beginning at 2753). • Proj. 2761.62.3.4 – 4.23 mi in SW Richland Co (Eagle Cave region). • Proj. 4626.31 – 3.63 miles in central Richland Co (Dog Hollow	 $208,800 $75,200 $169,200 $145,200	Richland Electric Co-Op	 10/1/2010 10/1/2010 4/1/2011 8/1/2011	High	 Akan, Richwood, Eagle Akan, Richwood, Eagle Eagle, Orion, Richwood Willow	Projects completed.

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project & Potential Resources**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
	and Upper Willow Watershed). • Proj. 1718.19 – 3.2 mi in NW Richland Co (Gault Hollow).	$128,000		4/1/2012		Bloom	
Hazardous Materials	Train First Responders on proper methods and techniques of minimizing impacts to people and property when a hazardous material is released	$5K Covered by HMEP Grant	EM Dept.	Ongoing	Medium	Richland County; CI of Richland Center; VIs of Boaz, Cazenovia, Lone Rock, Viola & Yuba; TNs of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow	Part of an ongoing and expanding effort to protect people and property from technological hazards.

EM Dept = Richland County Emergency Management Department
UW Ext = University of Wisconsin – Richland County Extension Office
** National Flood Insurance Program (NFIP) compliance elements

Appendix E: HAZUS Vulnerability Assessment

Richland County Vulnerability Report[140]

Identify Hazards

Steep topography in Richland County promotes fast runoff that can result in serious flooding, erosion and sediment problems. Flooding has been a major problem along the Pine River and its tributaries. Damaging floods occurred in 1951, 1952, 1956, 1960, 1966, and 1972. The most severe flood of record, in July 1951, followed a thunderstorm in which 4 inches of rain fell in 3 hours. Flooding along the Wisconsin River is caused by heavy rainfall and/or snowmelt. The normal flow of the Pine River is regulated by a mill pond dam in Richland Center. This dam is submerged during the 100-year flood, consequently it provides no protection from the 100-year flood.[141]

[140] Federal Emergency Management Agency
[141] From Richland's Flood Insurance Studies published in 1989, 1990 and, 1991 for communities in Richland County

HAZUS-MH Hazard Analysis

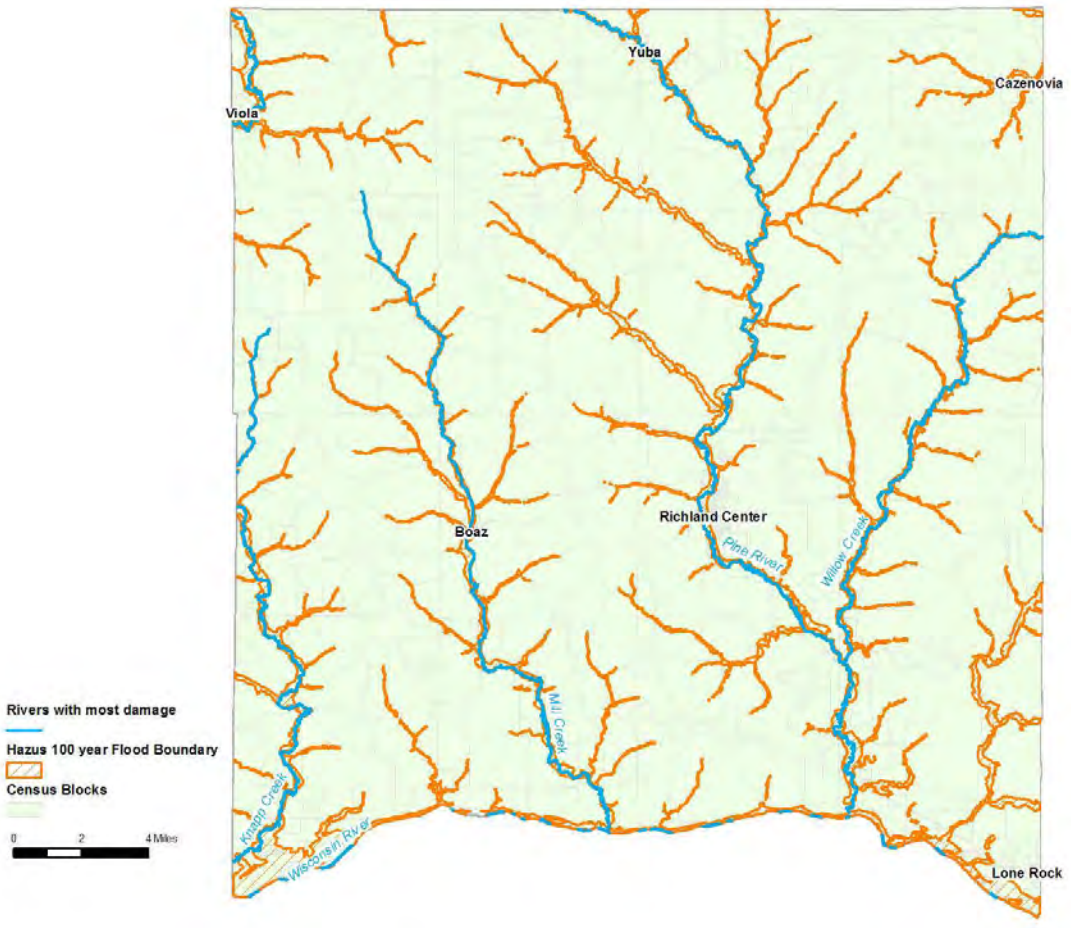
Flood analysis for Richland was performed using HAZUS-MH MR3 released in July 2007. The bundled aggregated general building stock was updated to Dun & Bradstreet 2006. Building valuations were updated to R.S. Means 2006. Building counts based on census housing unit counts are available for RES1 (single-family dwellings) and RES2 (manufactured housing) instead of calculated building counts.

The site specific inventory (specifically Schools, Hospitals, Fire Stations, Emergency Operation Centers and Police Stations) was updated using the best available statewide information.

HAZUS-MH was used to generate the flood depth grid for a 100-year return period calculated for 1 square mile drainage areas. The riverine model was determined from a user provided USGS 30m DEM and peak discharge values obtained for 5 reaches tabulated in 3 Flood Insurance Studies published in 1989, 1990 and, 1991 for communities in Richland County.

Figure 1 depicts the flood boundary from the HAZUS-MH analysis. The majority of flooding occurs along the Wisconsin River, Pine River, Knapp Creek, Mill Creek and, Willow Creek.

Figure 1: Richland County HAZUS-MH Analysis (100-Year Flood)



HAZUS-MH Aggregate Loss Analysis

HAZUS-MH was used to estimate the damages for a 100-year flood event in Richland County. An estimated 49 buildings will be damaged totaling in $19 million in building losses and $48 million in total economic losses. The total estimated number of damaged buildings, total building losses, and estimated total economic losses are shown in Table 1.

HAZUS-MH estimates 6 census blocks with losses exceeding $1 million. The distribution of losses is shown in Figure 2.

HAZUS-MH aggregate loss analysis is evenly distributed across a census block. Census blocks of concern should be reviewed in more detail to determine the actual percentage of facilities that fall within the flood hazard areas. The aggregate losses reported in this study may be overstated. Examples are provided in Figure 3.

Table 1: Richland County Total Economic Loss - 100-Year Flood

General Occupancy	Estimated Total Buildings	Total Damaged Buildings	Total Building Exposure X 1000	Total Economic Loss X 1000	Building Loss X 1000
Agricultural	2	0	$37,915	$2,343	$532
Commercial	40	0	$200,632	$12,059	$2,857
Education	0	0	$16,116	$1,879	$259
Government	2	0	$15,303	$1,196	$115
Industrial	7	0	$81,237	$6,894	$1,888
Religious/Non-Profit	2	0	$26,163	$981	$126
Residential	7,168	49	$952,606	$22,246	$13,380
Total	**7,221**	**49**	**$1,329,972**	**$47,598**	**$19,157**

The reported building counts should be interpreted as degrees of loss rather than as exact numbers of buildings exposed to flooding. These numbers were derived from aggregate building inventories which are assumed to be dispersed evenly across census blocks. HAZUS-MH requires that a predetermined amount of square footage of a typical building sustain damage in order to produce a damaged building count. If only a minimal amount of damage to buildings is predicted, it is possible to see zero damaged building counts while also seeing economic losses.

Figure 2: Richland Total Economic Loss - 100-Year Flood

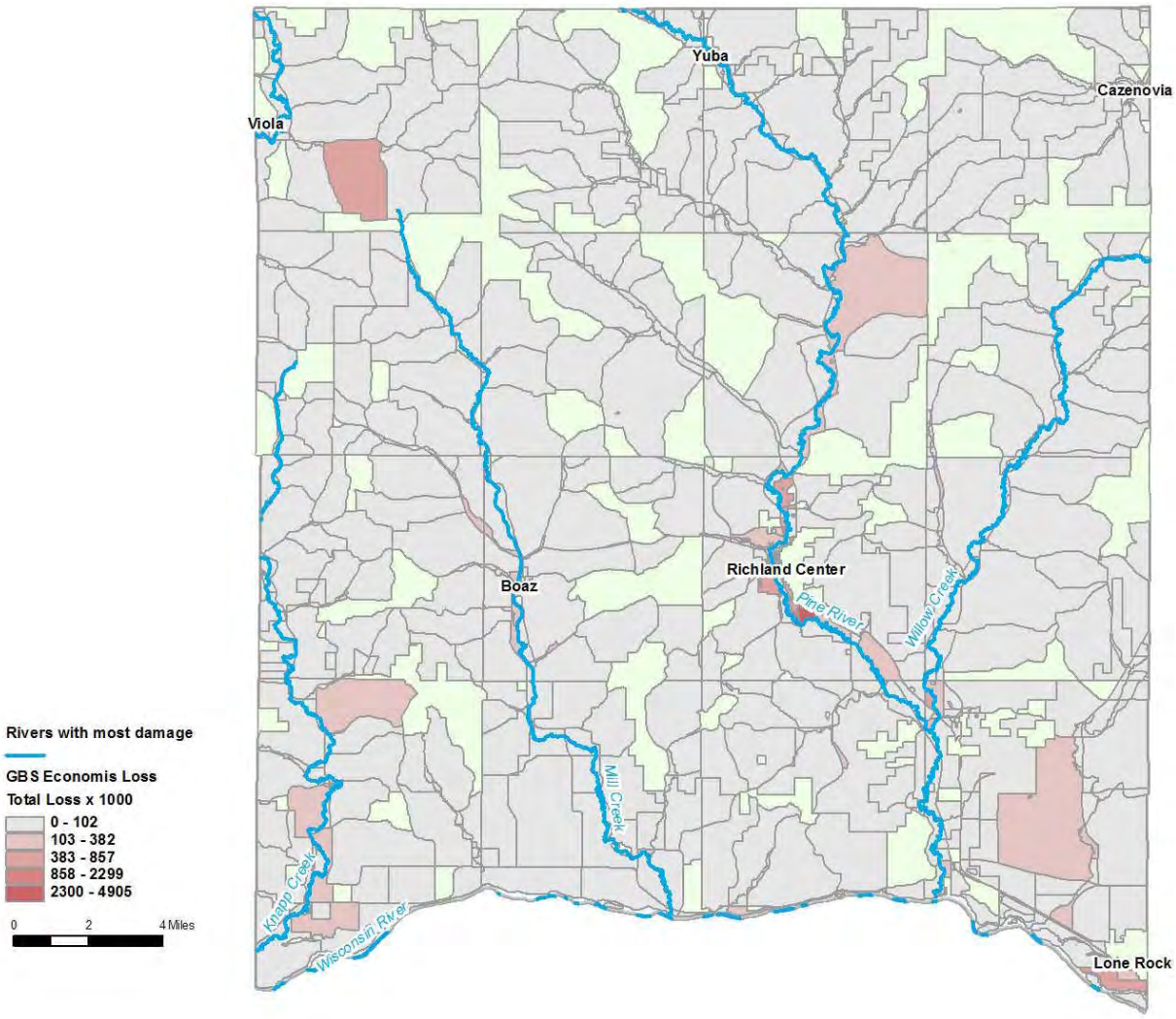


Figure 3a: Flood Damage Exposure in Richland

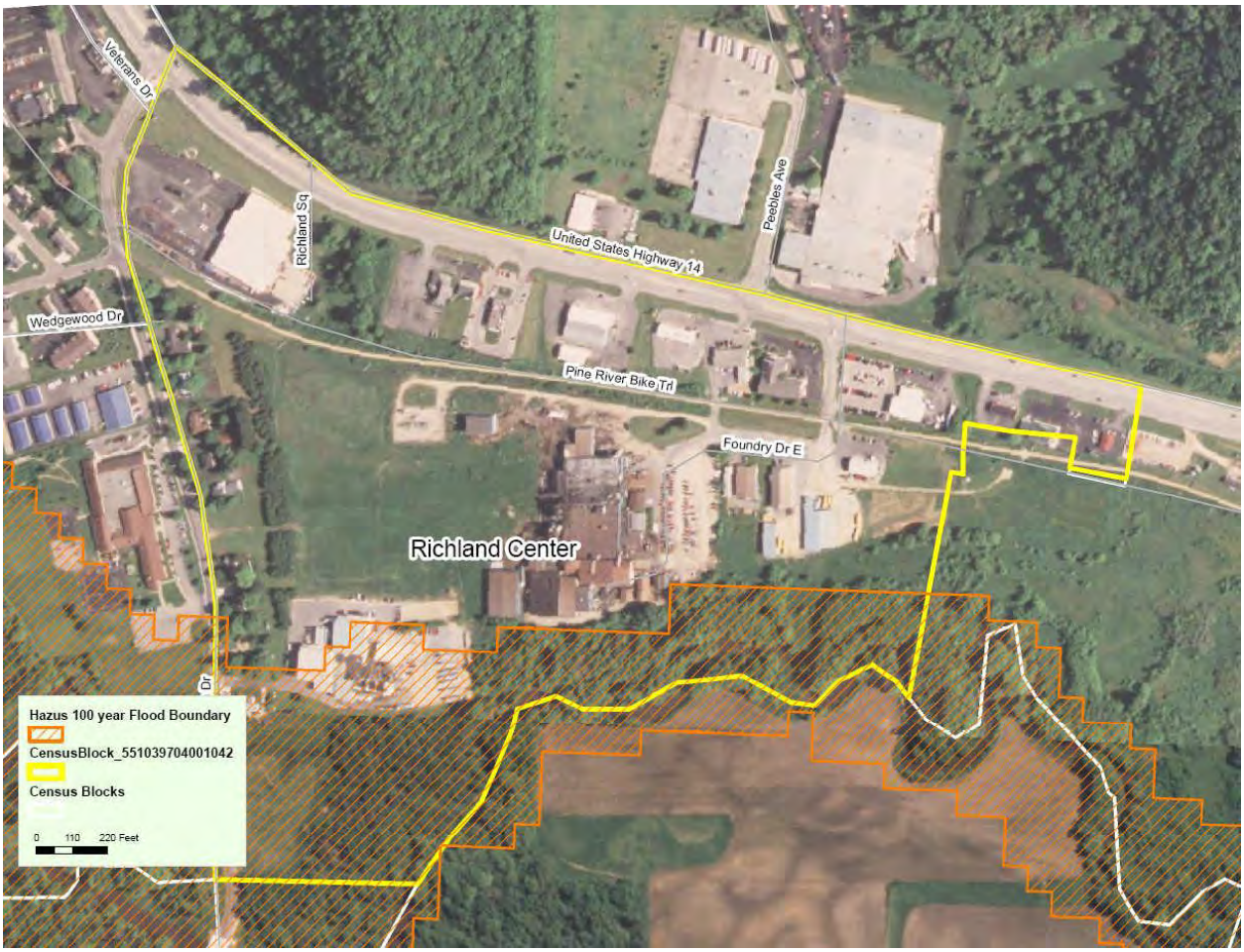


Figure 3a shows census blocks overlaid with the flood boundary and orthophoto in Richland Center along the Pine River. Census block 551039704001042 has an estimated building loss of $1.4 million with a combined replacement cost of $5 million. However, HAZUS-MH also estimates that 0 buildings are within the calculated flood boundary and that there are a total of only 7 residential and no other building types within this block. The orthophoto shows that in addition to the residential buildings, there are 7 or 8 non-residential buildings within the census block and one of them is partially within the flood boundary.

Figure 3b: Flood Damage Exposure in Shorewood

Figure 3b shows census blocks overlaid with the flood boundary and orthophoto of Richland Center. Census block 551039704004010 has an estimated building loss of $1.4 million and a combined replacement cost of $3.5 million. HAZUS-MH estimates that 15 residential buildings are within the calculated flood boundary for this block. However, the orthophoto shows only 3 buildings partially within the entire census block.

HAZUS-MH Essential Facility Loss Analysis

An essential facility would encounter many of the same impacts as any other building within the flood boundary. These impacts include: structural failure, extensive water damage to the facility, and loss of facility functionality (i.e. a damaged police station will no longer be able to serve the community).

The HAZUS-MH analysis identified 2 Schools that may be subject to flooding. A list of the essential facilities within Richland County is included in Tables 2 and 3. Maps of essential facilities potentially at risk of flooding are shown in Figures 4a & b.

Table 2: Richland Essential Facility Loss - 100-Year Flood

Class	Building Count	At Least Moderate Damage	At Least Substantial Damage	Loss of Use
Care Facilities	3	0	0	0
EOC	1	0	0	0
Fire Stations	5	0	0	0
Police Stations	5	0	0	0
Schools	21	2	0	0
Total	**35**	**2**	**0**	**0**

Table 3: Richland Damaged Essential Facilities

Facility Name
Buck Creek Mennonite School*
Richland Center High*

* Essential Facilities that may be outside of the 100 year flood boundary according to orthophoto interpretation or address verification.

Figure 4a: 100-Year Flood Boundary Overlaid with Essential Facilities

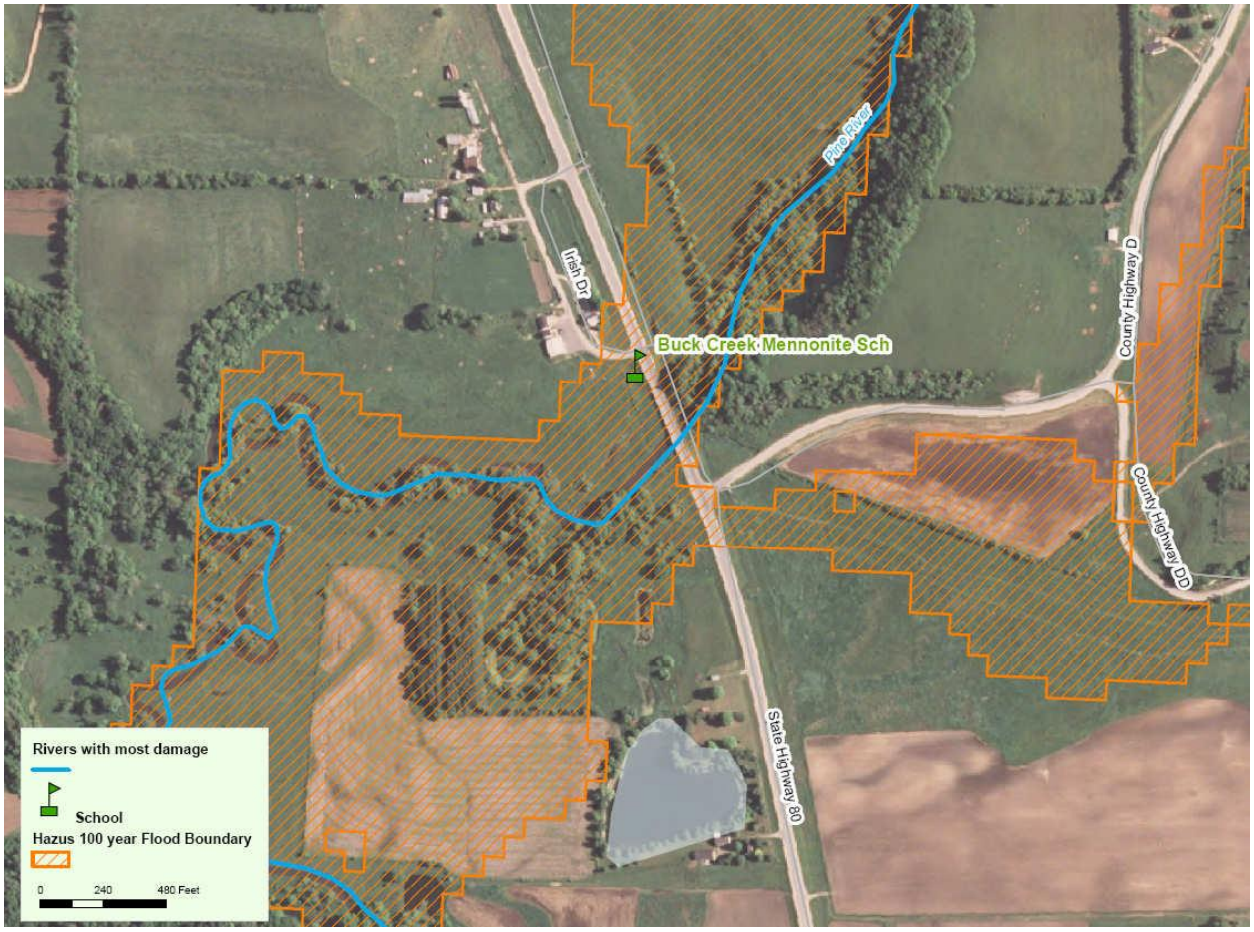
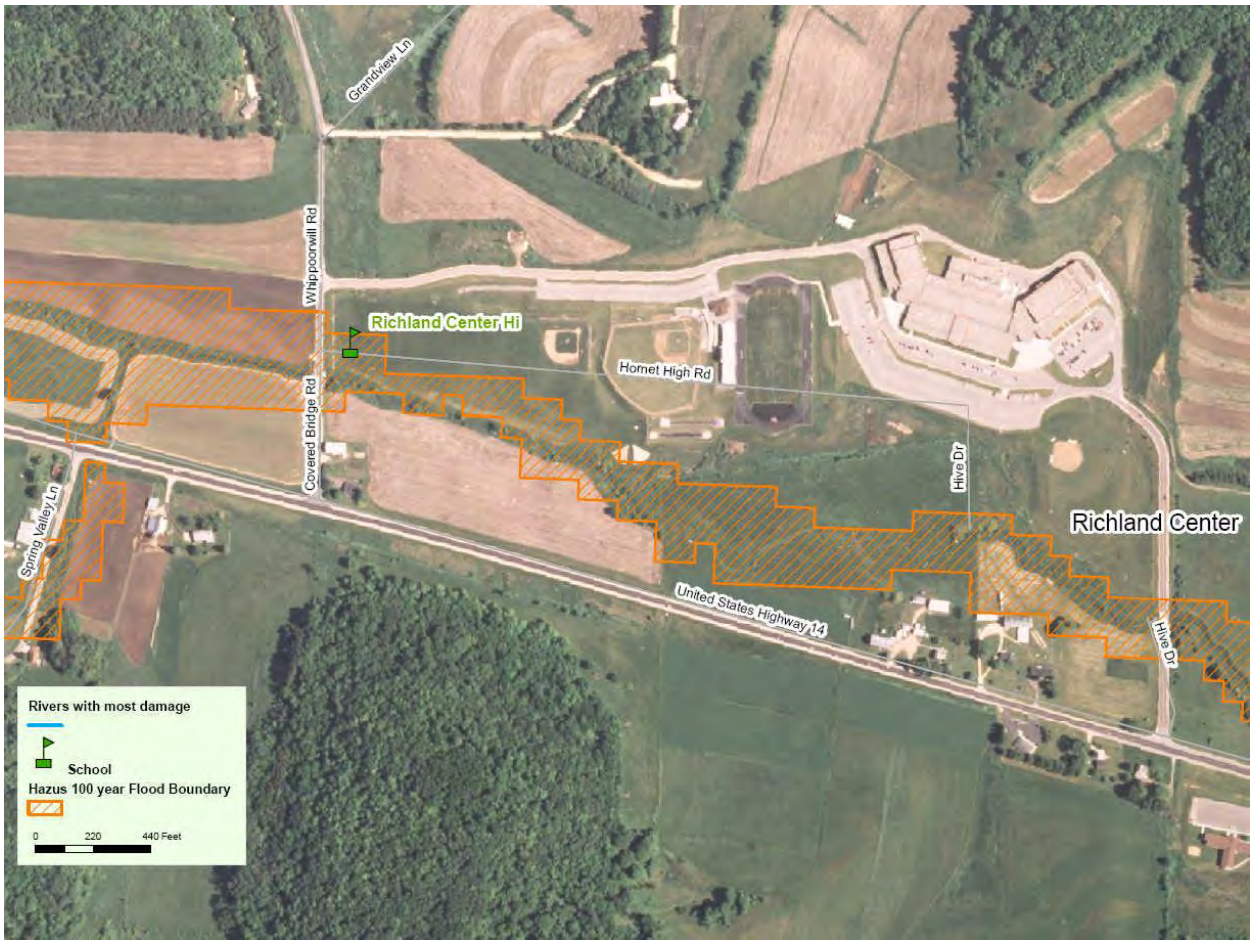


Figure 4b: 100-Year Flood Boundary Overlaid with Essential Facilities



Essential facility locations were imported from the best available statewide sources. Some instances have been observed where HAZUS-MH reports a site within the flood plain that cannot be confirmed by the corresponding orthophoto in Figures 4a & b. The essential facility damages reported by HAZUS-MH may be overstated.

HAZUS-MH Shelter Requirement Analysis

HAZUS-MH estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. HAZUS-MH also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 438 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 335 people (out of a total population of 17,924) will seek temporary shelter in public shelters.

HAZUS-MH State Property Loss Analysis

The flood boundaries were overlaid with State of Wisconsin property boundaries as provided by the Department of Natural Resources within Richland County. Table 4 provides a list of state properties impacted by the flood boundary. Figures 5a and 5b show examples of the inundated areas.

Table 4: Richland State Property Flood Inundation

State Property	Percent Inundated	Acres Inundated
Lower Wisconsin State Riverway	40%	2710
Scattered Wildlife	32%	471
Knapp Creek Wildlife Area	21%	345
Willow Creek Fishery Area	37%	269
Bear Creek Fishery Area	63%	160
Rem-mill Creek	64%	104
Rem-camp Creek	22%	86
Rem-knapp Creek	68%	73
Rem-pine River-Yuba	65%	68
Rem-milancthon Creek	12%	25
Rem-fancy Creek	51%	16
Rem-pine River	87%	16
Rem-elk Creek	14%	13
Rem-ash Creek	24%	13
Statewide Habitat Areas	88%	5
Rem-engine Creek	58%	4
Pine River System Fishery Area	100%	2

Figure 5a: Boundary of 100-Year Flood Overlaid with State of Wisconsin Properties

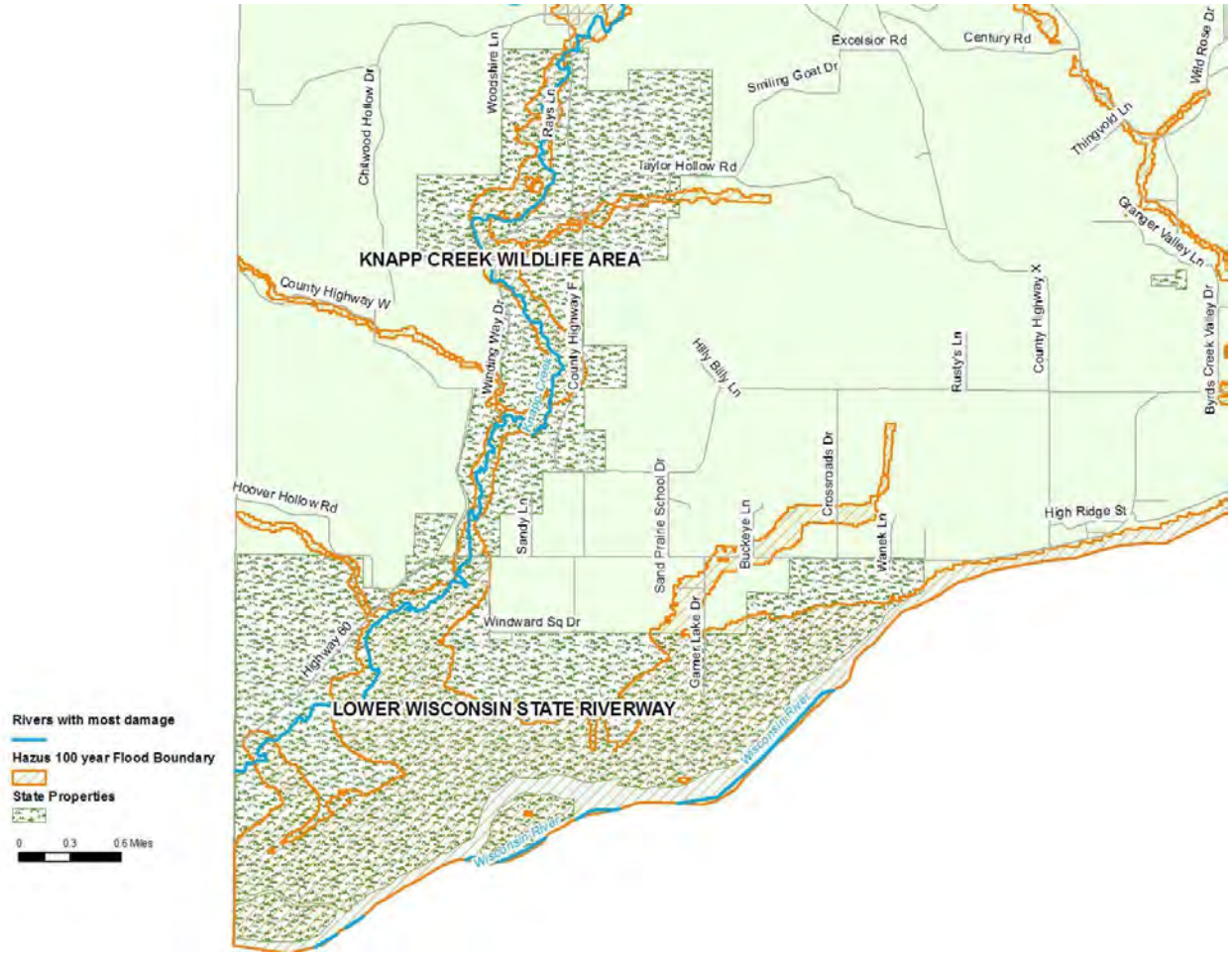


Figure 5b: Boundary of 100-Year Flood Overlaid with State of Wisconsin Properties

Appendix F: FEMA Region V: Risk MAP Richland County Community Profile

FEMA Region V: Risk MAP Page 1
Community Profile for Richland County, Wisconsin (Unincorporated Areas)

FEMA Community Identification (CID) number: 550356

Effective Flood Insurance Study (FIS) and/or Flood Insurance Rate Map (FIRM)
(FEMA Community Information System, as of January 2014)

Effective Date:	FIS dated 9/27/1991	Last Community Meeting:	11/15/1990
Level of Study:	Detailed Riverine with Floodway	Adoption Date:	Unavailable

Floodplain Management Program *(FEMA Community Information System, as of January 2014)*

Last Community Assistance Visit/Contact:	4/15/1992	Variances:	0

Community Rating System (CRS) Status *(FEMA Community Information System, as of January 2014)*: Not Participating

Demographics, Richland County *(U.S. Census, Year 2010 Data Collection)*

Population:	18,021	**Social Characteristics**	
Median Age:	43.0	Non-English Speakers:	5%
Elderly (65+):	19%	High School+ Education:	88%
Native:	0.4%	Bachelors+ Education:	15%

Industrial, Richland County *(U.S. Census, Year 2010 Data Collection)*

Population in labor force:	65%	Median income:	$44,821

Top 5 Industries:	23%	Manufacturing
	21%	Educational, Health and Social Services
	11%	Retail Trade
	10%	Agriculture and Forestry
	7%	Construction

Presidentially-Declared Disasters *(FEMA Region V, as of December 2013)*
Flood-Related Countywide Total *(Severe Storms, Flooding)*: 11
Other Hazards: Drought and Tornadoes

Insurance *(FEMA Region V, as of December 2013)*

Total Premiums:	$46,001	Coverage (in thousands):	$6,896
Total Policies in Force:	66	Total Claims:	24
		Total Paid for Claims:	$163,120

Repetitive Loss and Individual Assistance *(FEMA Region V, as of December 2013)*

Individual Assistance Total:	Unavailable				
Repetitive Loss Properties:	3	Losses:	7	Total Payments:	$93,160

Public Assistance, Richland County *(FEMA Region V, 1999 to 2013)*

Damage Categories:	Debris Removal, Protective Measures, Rds/Bridges, Public Buildings/Utilities, Water Control Facilities		
Project Amount:	$3,584,670	Total Obligated:	$2,801,381

Mitigation Plan

Hazard Mitigation Plan Richland County, Wisconsin	Effective: October 2009
	Expires: October 9, 2014

Community Profile for Richland County, Wisconsin (Unincorporated Areas)

Mitigation Projects *(FEMA, data.gov, as of August 2013)*

Project Type	Description	Project Amount	Cost Share Percentage
Hazard Mitigation Plan	August 2007 - Flooding and Severe Storms Multi-Hazard Mitigation Plan	$33,589	75%
Hazard Mitigation Plan	April 2011 - Severe Winter Storm Update of county hazard mitigation plan	$21,057	75%

Environmentally Sensitive Areas: *(U.S. Fish and Wildlife Service, July 2014)*

Endangered/Critical Species:	Higgins Eye Mussel, Sheepnose Mussel, Hine's Emerald Dragonfly
Wetlands/Shorelines:	Freshwater Emergent Wetland, Freshwater Forested/Shrub Wetland
CoBRAs and OPAs:	None Identified

Ongoing Studies

There are no ongoing FEMA studies in Richland County.

Richland County HMP Flooding Summary

Riverine Flooding and Flash Flooding: Richland County has a history of flooding primarily along the Wisconsin and Pine Rivers. The County has received 11 flood related Presidential Disaster Declarations and 22 flood events were recorded by the National Weather Service between 1950 and 2008.

Structures in the Floodplain: The Hazard Mitigation Plan for the County identified 543 residential and 3 commercial buildings in the 100-year floodplain.

Repetitive Loss Properties: There are at least 3 repetitive loss properties located in Richland County.

Frequently Flooded Roads: There are many roads throughout the County that are frequently and/or severely affected by flooding and/or landslides.

As part of the Hazard Mitigation Grant Program, Richland County was awarded $84,390 for acquisition/demolition of one structure in 2001; $33,589 to develop a hazard mitigation plan in 2007; and $21,057 to develop a hazard mitigation plan in 2011.

Desired Mitigation Projects

1) Acquire/elevate properties located in floodplain
2) Upgrade roadways
3) Install river gauges on Pine River and Mill Creek
4) Community outreach and education
5) Increase GIS mapping capabilities

Appendix G: Community Input

Richland County believes in the importance of gathering public input from interested parties in the community. To achieve this goal, the Emergency Management Office took every opportunity available to utilize various methods to publicize the opportunity for people to participate in the planning process and to gather input from interested parties. Scans of the meetings, press releases and public/legal notices follow.

DATE	SUMMARY OF OPPORTUNITY
8/2013	Surveys, with cover letters, sent to all municipalities (cities, villages, towns)
8/2013	Press release sent to all local media sharing information about the hazard mitigation planning process and an invitation for community participation
8/2013	Richland Co PDM plan update informational fliers made and distributed around the community in public buildings.
2/2014	Richland County All-Hazard Mitigation Plan Working Group Meeting
3/2014	Discuss plan and hazmit opportunities at Richland County Towns Association Meeting
Q4 2014 – Q2 2015	The Richland County EM Director contacted staff from the City of Richland Center and the Villages of Boaz and Lone Rock to speak to them individually about mitigation strategies since they were unable to send representation to the workgroup meetings. The communities discussed development, completed strategies and strategies for the next five years of the plan. These were provided to the contractor for inclusion in the plan update.
12/11/16	Initial mitigation planning and strategy meeting at the Village of Viola from 0900-1200. Present were the Village of Viola President, Clerk, two board members, and the Public Works Director; the WEM SHMO and Supervisor; a Wisconsin DOA representative; a representative from Vernon County and the Richland County Board Chairman and Emergency Management Director.

1/1/7	Second mitigation planning and strategy meeting at the Village of Viola from 1800-2100. Present were the Village of Viola President, Clerk, and two board members; a representative from Vernon County and the Richland County Board Chairman and Emergency Management Director as well as 12-15 members of the public.
Q4 2016	Final press release alerting the public to the completion of the plan and its availability for review and comment.
Q4 2016	Provide final information and adoption paperwork to municipalities.
Q4 2016	Release Legal Public Notice regarding the plan availability for public review and comment.
Q4 2016	Invite contiguous county emergency management directors to review and comment on the plan.
Q4 2016 – Q1 2017	Plan adoption meetings at Richland County and each municipality (e.g., city, village, town). Wisconsin state law requires that these meetings have agendas that are posted for public review prior to the open meetings.

One of the main ways people were made aware of the plan was the publication of a brochure (following) that was widely distributed in the public buildings around the community. The purpose of this brochure was to provide a general overview of the mitigation planning process, the impetus for planning and the scope of the final result.

8 August 2013

For More Information, Contact Darin Gudgeon, (608) 647-8187
For Immediate Release

RICHLAND COUNTY BEGINS HAZARD MITIGATION PLAN UPDATE

(Richland Center, WI) Richland County, like the rest of the State of Wisconsin, is vulnerable to a variety of disasters. Wisconsin has incurred disaster-related damages totaling $3 billion in the last three decades but future losses can be reduced through mitigation activities. A recent study by the Multi-hazard Mitigation Council shows that each dollar spent on mitigation saves society an average of four dollars. Since 1993 more than 400 disasters have occurred in the United States, affecting communities in all 50 states, costing the country over $500 million dollars per week and killing over 24,000 people.

Mitigation actions reduce or eliminate the long-term risk to human life and property from hazards. These preventative actions can be as simple as elevating a furnace in a basement that sometimes has water on the floor. Mitigation can also have a comprehensive approach such as relocating buildings out of the floodplain or strengthening critical facilities to prevent wind damage and provide stronger shelter.

In an effort to better prepare Richland County to manage its vulnerability to disaster, Darin Gudgeon, Richland County Emergency Management Director, applied for and received a Pre-Disaster Mitigation (PDM) plan update grant. This goal of this project is to complete an approvable plan update, which will serve as a roadmap that outlines potential cost-effective hazard mitigation activities, some of which might be available for future grant funding. Hazard mitigation plans and projects reduce overall risks to the population and structures while also reducing reliance on funding from actual disaster declarations. For example, the rigorous building standards adopted by 20,000 communities across the country are saving the nation more than $1.1 billion a year in prevented flood damages.

The plan is designed to look at the risks and vulnerabilities that the county faces from natural disaster and to develop mitigation strategies that might reduce future losses. As part of this planning process, Gudgeon is assembling a workgroup to review and guide the planning activities. The workgroup is reviewing initial background information about Richland County and has begun identifying strategies that might help.

Gudgeon stated, “I am very excited about this part of the planning process. The input from the workgroup can have long-lasting impacts, making Richland County safer and more disaster-resistant.”

FEMA has recognized the importance of having members of the community involved in the process and Gudgeon would like to ensure that all interested members of the community have an opportunity to provide input into the plan. If you are interested in more information about the plan or would like to provide input into the plan, please contact Darin Gudgeon at (608) 647-8187.

###

Date: 9 August 2013
To: Town, Village or City Leader
From: Darin Gudgeon, EM Director
Re: Pre-Disaster Mitigation (PDM) Plan

Richland County, like the rest of the State of Wisconsin, is vulnerable to a variety of disasters. Wisconsin has incurred disaster-related damages totaling $3 billion in the last three decades but future losses can be reduced through mitigation activities. A recent study by the Multi-hazard Mitigation Council shows that each dollar spent on mitigation saves society an average of four dollars. Since 1993 more than 400 disasters have occurred in the United States, affecting communities in all 50 states, costing the country over $500 million dollars per week and killing over 24,000 people.

Mitigation actions reduce or eliminate the long-term risk to human life and property from hazards. These preventative actions can be as simple as elevating a furnace in a basement that sometimes has water on the floor. Mitigation can also have a comprehensive approach such as relocating buildings out of the floodplain or strengthening critical facilities to prevent wind damage and provide stronger shelter.

Richland County's original pre-disaster hazard mitigation (PDM) plan is nearing the end of its five-year life so the Richland County Emergency Management applied for and received a PDM plan update grant. This goal of this grant is to complete an approvable plan update, which will serve as a roadmap that outlines potential cost-effective hazard mitigation activities, some of which might be available for future grant funding. The plan is designed to look at the risks and vulnerabilities that the county faces from natural disaster and to highlight mitigation strategies that might reduce future losses to life and property. As part of this planning process, **I need your help.**

The first step is asking that you please place an item on your **next** municipal meeting agenda to complete the attached survey. This very short survey will help us to identify the concerns that you have in your municipality and to capture ideas that you have for making your community safer and more disaster resistant. Please return your completed surveys to our consultant as soon as possible but **no later than September 30th**:

Lenora Borchardt
EPTEC, Inc.
7027 Fawn Lane
Sun Prairie, WI 53590-9455
FAX: 608-834-0802

After receiving your surveys, the information will be incorporated into the draft plan update, which is being guided by a workgroup of interested agencies and public members. The workgroup will also be tasked with reporting out on previous strategies and listing new strategies for your community. I would like to extend an offer for anyone from your leadership council, your municipal staff or your general community to contact me if they would like to join the workgroup. Please note that each incorporated municipality (i.e., city and village) must participate in the workgroup to be eligible for future grants. We expect that there will be 2-3 meetings to accomplish our goals. Interested parties from towns are welcome to participate as workgroup members but are not required to do so.

Finally, after the workgroup has a final draft, we will be sending copies of the plan to each of you for final review and adoption. It is important to note two things:

- Adoption of this plan will not cost your community anything. You will not be committing to completing any of the projects listed; instead it is a list of triaged ideas that can be accomplished should the funding and desire to complete them become available.
- If you do not adopt this plan, your community will not be eligible to apply for and receive mitigation project funding in the future.

Let me thank you in advance for the assistance that you are providing. This small investment of your time will help make our community a safer, healthier and more disaster-resistant community for years to come.

If you are interested in more information about the plan or would like to provide input into the plan, please feel free to contact me at (608) 647-8187 or by email at *gudgeond@co.richland.wi.us*

RICHLAND COUNTY NATURAL HAZARDS PREPAREDNESS & MITIGATION QUESTIONNAIRE

1. In the past five years, has your community experienced a natural disaster such as a severe windstorm, flood, wildfire, earthquake, etc.?
   - o No (If NO, skip to Question 2)

   If YES, which of these natural disasters occurred? (Please check all that apply.)

Event	When event last occurred:				
	Within past year	1-5 years ago	5-15 years ago	More than 15 years ago	Never
Drought	TN - Westford	TN – Ithaca TN - Orion TN - Sylvan			
Dust Storm					TN of Orion TN - Westford
Earthquake					TN of Orion TN - Westford
Flood	TN of Orion	VI-Cazenovia VI -Viola VI –Yuba TN - Orion TN – Sylvan TN - Westford	VI –Yuba TN - Ithaca TN - Orion TN - Sylvan	TN of Orion	
Lakeshore Erosion					TN of Orion
Landslide/ Debris Flow		TN – Ithaca TN – Sylvan TN - Westford	TN – Marshall TN - Sylvan		TN of Orion
Wildfire		TN - Westford			TN of Orion
Windstorm/ Tornado	TN of Orion	TN – Ithaca TN - Westford	VI –Viola TN - Forest		
Severe Winter Storm	TN – Marshall TN of Orion TN - Westford	TN of Orion TN - Sylvan	TN - Sylvan		
Other: Heavy Rains	TN - Forest		TN - Forest		
Other:					

2. For which of the following natural disasters do you think your community is at risk? (Check the appropriate box for each hazard.)

Event	Extremely Concerned	Very Concerned	Concerned	Somewhat Concerned	Not Concerned
Drought		TN - Ithaca	TN - Orion TN - Sylvan	VI –Viola TN of Willow	TN – Forest TN - Westford
Dust Storm					TN – Forest TN – Ithaca TN of Orion TN - Westford TN of Willow
Earthquake					TN – Forest TN – Ithaca TN – Orion TN - Westford TN of Willow
Flood	VI –Viola VI -Yuba		VI-Cazenovia TN - Ithaca TN - Orion TN - Sylvan	TN – Forest TN of Willow	TN - Westford
Lakeshore Erosion					TN – Forest TN – Ithaca TN – Orion TN - Westford TN of Willow
Landslide/ Debris Flow			TN - Marshall	TN – Forest TN - Ithaca	TN – Orion TN - Westford TN of Willow
Wildfire			VI -Viola	TN of Willow	TN – Forest TN – Ithaca TN – Orion TN - Westford
Windstorm/ Tornado		VI -Viola	VI –Yuba TN - Orion	TN – Forest TN – Ithaca TN of Willow	TN - Westford
Severe Winter Storm/ Ice Storm		VI –Viola TN - Marshall TN - Orion	VI –Yuba TN - Forest TN – Sylvan TN - Westford	TN – Ithaca TN of Willow	
Other: Heavy Rains			TN - Forest		

3. Has your community had damage to facilities or infrastructure (e.g., roads, public buildings, utilities?)
   - **VI of Cazenovia –** Some road damage after flood in 2007, 2008
   - **VI 0f Viola –** Yes, roads, roofs on all public buildings, flooding to community building, utilities – power lines for tornadoes and sewer mains for flooding.

- **VI of Yuba –** Road damage, stream bank erosion near roads, buildings, sewer.
- **TN of Forest –** Yes, Tornado 2005 – building,
- **TN of Forest –** Roads – 2000, 2003, 2005, 2007, 2008
- **TN of Ithaca –** Yes, Flooding effected roads and bridges
- **TN of Marshall –** Yes, roads
- **TN of Orion –** Roads
- **TN of Sylvan –** Roads and bridges have suffered damage from flooding.
- **TN of Westford –** Washed out roads
- **TN of Willow -** Roads

4. What facilities or infrastructure in your community do you think are especially vulnerable to damage during a natural disaster?
   - **VI of Cazenovia –** The village has one house in the Dam Failure Analysis done by Jewell Eng.
   - **VI of Viola –** Power lines for wind or ice storms, and Community Building for flooding.
   - **VI of Yuba –** Village garage, firehouse, sewer
   - **TN of Forest –** Roads
   - **TN of Ithaca –** Our roads can be vulnerable to heavy rains and flooding. Buildings can be affected by high winds.
   - **TN of Marshall –** Roads
   - **TN of Orion –** Roads
   - **TN of Sylvan** – (1) Electrical lines (2) Conservation dam (3) Bridges – due to flooding
   - **TN of Westford –** No
   - **TN of Willow -** Roads

5. How important do you think each of the following projects are in mitigating (i.e., lessening the impacts of) a natural disaster in your community?

Project	Very Important	Somewhat Important	Neutral	Not Very Important	Not Important
Protecting private property	VI-Cazenovia VI –Viola VI –Yuba TN - Sylvan	TN - Ithaca	TN of Orion		TN – Forest TN - Westford
Protecting critical facilities (hospitals, fire stations, etc.)	VI-Cazenovia VI -Yuba TN - Ithaca	VI -Viola	TN of Orion		TN – Forest TN - Westford
Preventing development in hazard areas	VI-Cazenovia TN - Ithaca	VI -Yuba	VI –Viola TN of Orion		TN – Forest TN - Westford
Enhancing the function of natural features	VI -Yuba	TN - Ithaca	VI –Viola TN of Orion	VI-Cazenovia	TN – Forest TN - Westford

(streams, wetlands)					
Protecting historical and cultural landmarks	VI –Viola VI -Yuba	VI-Cazenovia TN - Ithaca	TN of Orion		TN – Forest TN - Westford
Promoting cooperation among public agencies, citizens, non-profit organizations and businesses	VI –Viola VI -Yuba	VI-Cazenovia TN - Ithaca TN - Marshall	TN of Orion		TN – Forest TN - Westford
Protecting and reducing damage to utilities	VI-Cazenovia VI –Viola VI –Yuba TN - Ithaca TN - Marshall TN - Sylvan		TN of Orion		TN – Forest TN - Westford
Strengthening emergency services	VI-Cazenovia VI –Viola VI –Yuba TN - Ithaca TN - Sylvan	TN - Marshall	TN – Forest TN of Orion		TN - Westford

6. What ideas do you have for your community to mitigate natural disasters?
   - **VI of Cazenovia -** Possible relocation of house by the Dam.
   - **VI of Cazenovia -** Early high water alarm system on Dam**.**
   - **VI of Viola -** We have done a lot already. Moving furnaces to higher floors in community building. EAP grant helped with sewers shutoffs, etc.
   - **VI of Viola –** Electric Utility could look at doing sections of line underground for a project for each year.
   - **VI of Yuba –** Upper stream water shed improvements
   - **TN of Ithaca –** Just to keep up basic maintenance on roadways. Keeping culverts and ditch lines clean. Keep brush and trees cut back. Keepings gravel roads and driveways built up and crowned to get water away to ditch lines.
   - **TN of Marshall –** Work together to solve problems
   - **TN of Orion –** Communicate better with emergency services
   - **TN of Westford -** NONE

7. Do you have any community building projects (e.g., subdivisions, office/industrial parks, roads) slated to be built in the near future? If so, please describe it (e.g., project name, location, type, size)?

- **Vl of Cazenovia –** Just built new village hall/Fire Station. No other projects slated in the future.
- **Vl of Viola –** NONE
- **Vl of Yuba –** NONE
- **TN of Forest –** NONE
- **TN of Ithaca –** Possibly constructing a building for our Ithaca First Responders to store their ambulance and to host meetings in.
- **TN of Marshall –** NONE
- **TN of Orion –** NONE
- **TN of Sylvan –** NONE at this time
- **TN of Westford –** NONE
- **TN of Willow -** NONE

Urgent News Release #1

Richland County Emergency Management
Darin Gudgeon, Director **Angie Rizner, PIO**
(608) 647-8187 **(608) 649-5921**
darin.gudgeon@co.richland.wi.us **angie.rizner@co.richland.wi.us**

For immediate release: **November 19, 2013**

RICHLAND COUNTY BEGINS HAZARD MITIGATION PLAN UPDATE

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-More -

received a Pre-Disaster Mitigation (PDM) plan update grant. This goal of this project is to complete an approvable plan update, which will serve as a roadmap that outlines potential cost-effective hazard mitigation activities, some of which might be available for future grant funding. Hazard mitigation plans and projects reduce overall risks to the population and structures while also reducing reliance on funding from actual disaster declarations. For example, the rigorous building standards adopted by 20,000 communities across the country are saving the nation more than $1.1 billion a year in prevented flood damages.

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- End -

SIGN-IN

Event: Richland Co HazMit Mtg **Date:** 27 FEB 14 **Location:** Richland Ctr

Name (Please Print)	Agency/Department	Email/Phone Number
LENORA BORCHARDT	EPTEC	—
Darrin Gudgeon	Richland Co EMS	darrin.gudgeon@co.richland.wi.us
John T. Heinen	RC - DEM	john.heinen@co.richland.wi.us

Richland County Towns Association Meeting

March, 2014

Governmental & Public Input

Planning creates a way to solicit and consider input from diverse interests. Successful community mitigation begins with a commitment from government officials throughout the county.

Involving stakeholders is essential to building community-wide support for the plan. In addition to emergency managers, the planning process involves other government agencies (e.g., zoning, floodplain management, public works, community and economic development), businesses, civic groups, environmental groups and schools. Vital information provided by these groups helps insure that the plan is workable within the framework of the community's priorities.

Adoption of the Plan

Local units of government participating in a multi-jurisdictional planning process must adopt the final plan for the municipality to be eligible for future mitigation funds including grants available through FEMA. **Local units (i.e., towns, villages, cities) that do not participate would be NOT eligible to receive funds** until such time that they meet these requirements and adopt a plan.

History

Since 1993 more than 400 disasters have occurred in the United States, affecting communities in all 50 states, costing the country over **$500 million dollars per WEEK and killing over 24,000 people**.

Mitigation Planning Facts

► A recent study by the Multihazard Mitigation Council shows that each dollar spent on mitigation saves society an average of four dollars.

► The rigorous building standards adopted by 20,000 communities across the country are saving the nation more than $1.1 billion a year in prevented flood damages.

► Hazard mitigation plans and projects reduce overall risks to the population and structures while also reducing reliance on funding from actual disaster declarations.

► Section 409 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (P.L. 93-228, as amended) is the impetus for involvement of state and local governments in evaluating and mitigating natural hazards as a condition of receiving federal disaster assistance. Section 409 states that communities are obligated to try to reduce any hazard that has received relief funding in the past. Developing a hazard mitigation plan provides an opportunity to meet this requirement by developing strategies for reduction of potential losses from future natural disasters.

NOTES: _____

_____

For further information please contact:

Richland County Emergency Management
181 W Seminary Street
Richland Center WI 53581
(608) 647-8187

Pre-Disaster Mitigation Planning

Creating Safe,

Sustainable

Communities

Prepared by:
Richland County
Division of Emergency Management
181 W Seminary ST
Richland Center, WI 53581

What is Hazard Mitigation?

Hazard mitigation is sustained action taken to reduce or eliminate long-term risk to people and their property from hazards.

Floods, ice storms, tornadoes and forest/wild fires – these are all functions of the natural environment and only become hazardous when they threaten our "built" environment with destruction. These hazards will occur one day. When this happens, the results can be appreciably different from past outcomes if our community takes action today.

Risk Reduction

The goal of risk reduction is to reduce the risk to life and property, which includes existing structures and future construction, in the pre and post-disaster environments. This is achieved through regulations, local ordinances, land use and building practices and mitigation projects that reduce or eliminate long-term risk from hazards and their effects.

Why Develop a Plan?

Mitigation plans form the foundation for a community's long-term strategy to reduce disaster losses and break the cycle of disaster damage, reconstruction and repeated damage. The planning process is as important as the plan itself. It creates a framework for risk-based decision-making to reduce damages to lives, property and the economy from future disasters.

State, tribal and local governments are required to develop a hazard mitigation plan as a condition for receiving certain types of non-emergency disaster assistance. The Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 93-288), as amended by the Disaster Mitigation Act of 2000, provides the legal basis for state, local and tribal governments to undertake a risk-based approach to reducing risks from natural hazards through mitigation planning.

The City of Darlington, WI was ravaged by floodwaters season after season. The community was disintegrating as people left, structures deteriorated and funds were used to repair past damages instead of build for the future. City's leaders completed a mitigation plan that identified multiple strategies to prevent future damages; many of which were covered by grants. After the flooding of 2007 and 2008, the community realized the benefits of the projects - damages were minimal, property values have increased and the citizens are proud of their work. This and other WI success stories are found at http://emergencymanagement.wi.gov/mitigation/stories.asp

Required Information

- Flood maps
- Identification of potential hazards
- History of occurrences
- Hazard impact projections
- Location of critical facilities
- Identification of high-risk facilities (schools, fire station, nursing homes, etc.)
- Location of repetitive loss structures
- Development & prioritization of mitigation projects
- Other materials as identified

Hazard Mitigation Planning Process

1. **Organize Resources-** From the start, communities should focus the resources needed for a successful mitigation planning process. Essential steps include identifying and organizing interested members of the community, particularly those with the technical expertise required during the planning process.

2. **Assess Risks-** Next; communities need to identify the characteristics and potential consequences of natural hazards. It is important to understand how much of the community can be affected by specific hazards and what the likely impacts would be for important community assets.

3. **Develop a Mitigation Plan-** Armed with an understanding of the risks posed by natural hazards, communities need to determine what their priorities should be and then look at possible ways to avoid or minimize the undesired effects. The result is a natural hazard mitigation plan and strategy for implementation.

4. **Implement the Plan & Monitor Progress-** Communities can bring the plan to life in a variety of ways ranging from implementing specific mitigation projects to changes in the day-to-day operation of the local government. To ensure the success of an on-going program, it is critical that the plan remains effective. Thus, it is important to conduct periodic evaluations and make revisions as needed.

Appendix H: Inter-Revision Updates

This plan will undergo major revisions every five years per the FEMA requirements. Richland County has recognized that there may be information that should be added to the plan between the five year updates but that the costs of continuous updates, printing and distribution can be excessive. This section is designed to hold that information that is gathered between the five year updates. It is felt that only having to reproduce and distribute one section between updates will lessen the costs to the county.

Potential Areas of Concern Identified:

- No additional concerns have been identified to date